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Strategic Development of Hospitals for Infectious Diseases —A Dynamic Capability Approach

Huang Min

Doctor of Management

Supervisor:
PhD Nelson Antonio, Professor,
ISCTE University Institute of Lisbon

June, 2020

BUSINESS
SCHOOL

Marketing, Operations and General Management Department

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Declaration

I declare that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and that to the best of my knowledge it does not contain any material previously published or written by another person except where due reference is made in the text.

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Abstract

Public health emergencies have the characteristics of sudden, devastating and unpredictable. The novel coronavirus (COVID-19) pandemic has spread worldwide in 2019, posing enormous threats to human health, global politics, and economy. The whole world is encountering a severe situation of responding to emerging epidemics. Chinese hospitals for infectious diseases undertake the special responsibilities for emergency response and treatment to emerging and re-emerging infectious diseases, and make contributions to safeguarding people's health and social stability. However, affected by the continuous decline of the incidence of infectious diseases and the insufficient government compensation mechanism, the survival and development of specialized hospitals for infectious diseases are severely restricted and generally facing survival crisis.

In terms of data collection, this study combined dynamic capability theory, resource-based view theory and strategic alliance theory. Through multiple-case study, the qualitative data are processed with QSR NVivo 12 software. This thesis comprehensively analyzes the development status, hospital resources, core competitiveness, dynamic capabilities, strategic alliances (Medical Treatment Alliance), strategic adjustment and performance of infectious disease hospitals in China. On the basis of data analysis, this research constructs the development strategy model of infectious disease hospitals in the rapidly changing environment, and puts forward the coping strategies for the survival and development of infectious disease hospitals. The research conclusion is consistent with the propositions and the existing literature, and considers that the competitive advantage is the concrete embodiment of the dynamic capability, and the capability of public health events' emergency response and disposal is the most important dynamic capability of Chinese infectious disease hospitals. The research results provide scientific basis and useful reference for the infectious disease hospitals to formulate the sustainable development strategies and the government to formulate public health policies.

Keywords: Hospitals for Infectious Diseases; Dynamic Capabilities; Development Strategy; China

JEL: I18, L1

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Resumo

As emergências da saúde pública não só são inesperadas, como são devastadoras e imprevisíveis. A nova pandemia (COVID 19), ao espalhar-se por todo o mundo, colocou novos e enormes desafios à saúde pública, à economia e à política internacional. Todo o mundo necessita de preparar-se para responder às epidemias emergentes. Os hospitais chineses para doenças infeciosas têm como missão dar uma resposta rápida às doenças infeciosas emergentes e re-emergentes e contribuir para a salvaguarda da saúde pública e da estabilidade social. Contudo, devido ao declínio, nos últimos anos, das doenças infeciosas e ao insuficiente mecanismo de compensação governamental, os hospitais chineses viviam numa permanente crise de sobrevivência.

Para a recolha de dados, esta tese combinou a teoria das capacidades dinâmicas com a teoria baseada nos recursos e a teoria das alianças estratégicas. Os dados foram posteriormente tratados com o software NVivo 12. Esta tese analisa de um modo compreensivo os recursos, as competências nucleares e as capacidades dinâmicas, assim como as alianças estratégicas dos hospitais chineses de doenças infeciosas. Baseando-se na análise dos dados, esta tese propõe uma estratégia de desenvolvimento para os hospitais de doenças infeciosas para os tempos de mudança que vivemos. As conclusões estão de acordo com as proposições extraídas da revisão de literatura e uma das conclusões é que vantagem competitiva é a personificação das capacidades dinâmicas. Os resultados desta tese podem contribuir para a formulação de uma estratégia sustentada para os hospitais de doenças infeciosas e ajudar o governo na formulação de políticas públicas.

Palavras-chave: Hospitais de Doenças Infeciosas; Capacidades Dinâmicas; Estratégia; China

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1. Projeto Financiado: Projeto de pesquisa da Comissão de Saúde de Shanghai (201940014). Nome do Projeto: Desenvolvimento estratégico dos Hospitais de Doenças Infecciosas com base na teoria das capacidades dinâmicas.

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摘 要

突发公共卫生事件具有突发性、破坏性和不可预测的特点。2019 新型冠状病毒肺炎疫情在全球蔓延，对人类健康，世界政治、经济造成巨大威胁，全世界面临应对新发重大传染病的严峻形势。中国的传染病专科医院承担公共卫生事件应急、救治的特殊职能，为维护人民的生命健康和社会稳定做出贡献的贡献。受传染病发病率持续下降、政府补偿机制不完善的大环境影响，传染病专科医院生存和发展受到严重制约，普遍面临生存危机。

在数据收集方面，本研究将动态能力理论与资源基础观理论、战略联盟理论相结合，通过案例研究的方法，数据用QSR NVivo 12软件进行处理。本文全面分析中国传染病专科医院的发展现状、医院资源、核心能力、动态能力、战略联盟（医疗联合体）、战略调整和绩效之间的关系。在分析数据的基础上，本文构建传染病专科医院在快速变化环境下发展战略模型，提出传染病专科医院生存发展的应对策略。研究结论与命题和文献综述一致，其中一个结论是竞争优势是动态能力的具体体现。研究成果为中国传染病专科医院制订可持续发展战略，为政府制订公共卫生政策提供科学依据和有借鉴意义的参考。

关键词：传染病专科医院；动态能力；发展战略；中国

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The doctoral degree is the supreme “crown” of academic education. The process of pursuing a doctoral degree and writing a doctoral thesis is extremely difficult. But I am convinced that as long as I persevere in unremitting self-improvement and keep climbing the peak, I will certainly go beyond myself and achieve my life goal.

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博士学位是学历教育中最高的“皇冠”，博士求学过程和论文写作过程异常艰辛，但我相信只要坚持自强不息的理想信念，不断攀登，一定会不断超越自己，实现自己的人生目标。

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List of Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
CRRT	Continuous Renal Replacement Therapy
CEO	Chief Executive Officer
CNKI	China National Knowledge Infrastructure
COVID-19	2019 Novel Coronavirus Diseases
CPHMC	Chongqing Public Health Medical Center
DC	Dynamic Capability
DCT	Dynamic Capabilities Theory
ECMO	Extracorporeal Membrane Oxygenation
HFMD	Hand, Foot, and Mouth Disease
HR	Human Resource
HSPH	Harbin Sixth People's Hospital
RBV	Resource-based view
SAs	Strategic Alliances
SARS	Severe Acute Respiratory Syndrome
SFDGH	Shanghai Fengxian District Guhua Hospital
SPNAIDH	Shanghai Pudong New Area Infectious Diseases Hospital
SPHCC	Shanghai Public Health Clinical Center
TCM	Traditional Chinese Medicine
VRIO	Value, Rarity, Imitability and Organization
VRIN	Valuable, Rare, Imperfectly imitable, and Nonsubstitutable
WFPH	Wuxi Fifth People's Hospital
WHO	World Health Organization
WOS	Web of Science
YSPH	Yancheng Second People's Hospital
ZFPH	Zunyi Fourth People's Hospital

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Chapter 1: Introduction

1.1 General setting

Infectious diseases have long been considered as a threat to human survival and health, hindering social and economic development. The prevalence of infectious diseases in a society or region is an important indicator of the health condition of its people. Therefore, keeping the risk of infectious diseases at the minimum level is an important guarantee for socioeconomic sustainable development. And the ability to control infectious diseases signifies the comprehensive strength of a society (Chen, Chen, & Du, 2005). With the transformation of Chinese society, economic, social and environmental factors pose a greater threat to public health. Along with frequent exchanges with the “global village”, China now faces severe situation in terms of response to acute infectious diseases. A total of 10,244,507 cases of infectious diseases were reported in the country (excluding Hong Kong, Macao and Taiwan) in 2019 (from 0:00 on January 1 to 24:00 on December 31) with 25,285 deaths. The reported incidence rate was 733.57/100 thousand and the mortality rate was 1.81/100 thousand (National overview of statutory epidemic situation in 2019, 2020). The assessment report by the World Health Organization (WHO) holds that response to infectious diseases is still a top priority. An outbreak of 2019 novel coronavirus diseases (COVID-19) in Wuhan, China has spread quickly nationwide. WHO reported that as of 3:23 pm CEST, 26 June 2020, there have been 9,472,473 confirmed cases of COVID-19, including 484,236 deaths globally (WHO coronavirus diseases (COVID-19) dashboard, 2020).

As an important part of improving the modern medical service system, China's infectious disease hospitals undertake special public health functions in accordance with the law of the people's Republic of China on the prevention and control of infectious diseases. However, with the evolution of the disease spectrum, the incidence of infectious diseases continues to decline, resulting in an obvious lack of business volume of infectious disease hospitals. In addition, most infectious disease hospitals receive insufficient government compensation and are located in the suburb of the city, which makes it inconvenient for patients to see a doctor, and also leads to the decrease of the workload of diagnosis and treatment of common infectious diseases in the hospital year by year.

Infectious disease hospitals face great challenges in the development of talents, equipment, disciplines and other aspects, and daily operations also facing great difficulties. In particular, the expansion of the general hospital, resulting in serious loss of medical staff in infectious disease hospitals, difficulties in talent recruitment, and instability of staff, has become a bottleneck problem restricting the development of infectious disease hospitals. On the other hand, with the continuous strengthening of the prevention and control of infectious diseases, the state puts forward higher requirements for the emergency treatment capability of infectious disease hospitals. However, the capability of infectious disease hospitals is far from the expected value of the state and society.

Unlike western countries that have hospitals for infectious diseases built in general hospitals, the system of China's hospitals for infectious diseases follows the Soviet model. With the reform and opening-up and the establishment of socialist market mechanism, especially in the 21st century, China's general hospitals gain fast development, most of which have set departments of internal medicine, surgery, gynecology, pediatrics, infectious diseases and so forth, thus making it difficult for specialized hospitals to develop. Moreover, hospitals for infectious diseases face problems like how to compete with general hospitals and how to get patients' trust.

In general, the scale of hospitals for infectious diseases in China is relatively small. The total number of these hospitals is 164, with 160 public hospitals and only 19 first-grade hospitals equipped with over 500 beds. Most have 50 to 300 beds, accounting for 60 percent of the total number (Zhao, Yang, & Wu, 2014). **There are mainly three modes of establishing infectious disease hospitals:** First, the hospitals that only take infectious diseases into their diagnosis and treatment scale and **only receive patients with infectious diseases**, and the patients with infectious diseases as well as other complications need to go to general hospitals. The Infectious Diseases Hospital of Suqian City, Jiangsu Province belongs to this mode. Second, the merger of the infectious disease hospitals with the general hospitals, in which the infectious diseases wards are basically in a vacant state as a department, only for the emergency start-up. The Princess Margaret Hospital of Hong Kong belongs to this mode. The third mode is to take the path of development of "Large-Special and Small-General". The Second Hospital of Nanjing City, Jiangsu Province and the Third People's Hospital of Nantong City are typical examples of successful transition and development (Zhao, Yang, & Wu, 2014). Except few infectious disease hospitals that have developed comprehensive disciplines earlier, the disciplines in China's infectious disease hospitals tend to be unitary. Most of the diagnostic and

therapeutic tools are still focused on the treatment of some unitary gastrointestinal infectious diseases such as hepatitis. The construction of related disciplines and second-class disciplines is insufficient, far from meeting the requirements for the prevention and control of infectious diseases and lacking the ability to independently perform the comprehensive medical treatment for emergent infectious diseases (Dong, Ge, & Wang, 2011). Wei et al. (2011) surveyed 12 prefecture-level infectious disease hospitals in Jiangsu Province. The survey results showed that most infectious disease hospitals only have clinical departments which are closely related to the prevention and treatment of infectious diseases, such as the department of infectious diseases, department of liver diseases and department of tuberculosis supportive departments such as medical department, surgical department, intensive care units are insufficient, and their comprehensive treatment capabilities are poor. The clinical departments of the infectious hospitals are set up relatively unitary, and the comprehensive technical strength and professional ability are hard to be improved, which fail to meet the demand for clinical diagnosis and treatment of emerging and re-emerging infectious diseases.

Especially since April 2010, the reform of public hospitals has been fully implemented in 16 pilot cities for medical reform across the country, marking that the reform of public medical institutions has entered a stage of substantial advancement. With dual attributes of both a public medical institution and a public health institution, the infectious diseases hospital faces unprecedented opportunities and challenges in the new round of medical reform (Tao & Zhuo, 2012). The reform of public hospitals is one of the core contents of the new round of health system reform, and it is also a difficult and hot issue for the implementation of new medical reform policies. As infectious disease hospitals, how to self-reform and improve the core competitiveness by taking the opportunity of public hospital reform and reforming their operating mode can not only reflect the public welfare of infectious disease hospitals and better fulfill the medical rescue tasks of public health incidents given by the government and society, but also solve the dilemma faced by the development of infectious disease specialist hospital. This is also a problem requiring high attention, serious thinking, active exploration and urgent solutions (Xu, 2014).

Therefore, it is quite necessary for hospitals for infectious diseases to not only adapt to external environment changes but also make fully use of various resources to survive and develop competitiveness in the process of providing service.

In recent years, most special infectious disease hospitals throughout China have been actively exploring the direction of strategic transformation and development and trying to obtain “new vitality” through “self-reform” (Zhang & Lu, 2016). A small number of infectious disease hospitals begin to explore the development ideas of “strong special and big comprehensive” for infectious disease hospitals, such as Beijing YouAn Hospital and Beijing Ditan Hospital. Some special infectious disease hospitals are managed by general hospitals, such as the Infectious Disease Hospital of Yangzhou City (Yang, 2010). In recent years, the practice exploration of medical treatment combination has been carried out in China. Some infectious disease hospitals have also begun to conform to the trend of the development of the medical treatment combination, such as the National Alliance of Infectious Diseases Hospital led by Beijing Ditan Hospital. Therefore, each hospital needs to carefully examine their respective strengths and weaknesses, conduct scientific analysis of future markets, complete their own positioning, focus their limited resources on the construction of advantageous areas, form their core competencies, gain competitive advantage and increase efficiency (Yang, Zhang, & Yang, 2009).

Existing research on the development of hospitals for infectious diseases focus mainly on their economic benefits and returns, inputs and incomes, state subsidies and benefits, scale comparison between hospitals for infectious diseases and general hospitals, and difficulties faced by hospitals for infectious diseases. Most of the studies are about problem description and phenomenon analysis, thus lacking systematic evaluation and analysis on how these hospitals can maintain competitiveness and develop coping strategies. Hospitals must have their own competitive advantages to survive and develop in the fierce competition. However, if a hospital wants to keep moving forward, it needs not only competitive advantage but sustains the advantage. A firm is said to have a sustained competitive advantage e when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors and when these other firms are unable to duplicate the benefits of this strategy (Barney, 1991). Strategies help hospitals to seek and maintain the maximum profit in competition, and hospitals with stronger capacity for profit are more likely to survive. What kind of medical service can hospitals for infectious diseases provide? How do they compete with general hospitals and other specialized hospitals? What is their core competence? The Yangtze River Delta, as China's more economically developed region, is representative of the current situation. Therefore, by applying the dynamic capability theory in strategy research and the strategic alliance theory and based on large-scale survey and case study, the thesis selects 8

representative hospitals for infectious diseases in the region to analyze their core competence and problems. Most of the scholars have extensively conducted discussion on the emergence and development of strategic alliance theory and dynamic capability theory. The characteristics of the studies have shown the tendency of shifting from economic mathematical methods to behaviorism methods (Zhang, Liu, & Li, 2003). The strategic alliance is an important source of resources and knowledge, as well as an important source of competitive advantage. Therefore, research on strategic alliances has very practical significance (Xu & Xu, 2003). Some researchers use strategic alliance theory to analyze the performance in healthcare systems (Adams, 2000). Chu and Chiang (2013) examined the effects of strategic alliance on the efficiency of hospitals controlled by the Department of Health in Taiwan. They found that the efficiency of the hospitals improved after they formed strategic hospital alliances. In addition, many scholars have consecutively put forward the concept and theoretical framework of dynamic capability. However, the viewpoints are not uniform. The views of domestic and foreign scholars vary in what is dynamic in addition to its definition, connotation and extension. There are few articles that use a wide range of questionnaires and cross-case studies. Although some scholars use questionnaires, their conclusions are not convincing because their theoretical reviews and model inference are too weak. Among the existing research results, there are few studies that use hospitals as a case study, and there is no literature taking the infectious diseases hospital as a research object. Therefore, it is necessary to comb out the current situation of theoretical research of dynamic capability theory in detail, synthesize the viewpoints of different branch theories and empirically test the theoretical framework and theoretical assumptions of dynamic capability based on large-scale investigation method and case study method, and try to integrate different research methods to enhance the depth of theoretical research and the persuasiveness of research conclusions (Liu, Xiao, & Liu, 2012).

1.2 Purpose

The purpose of the study is to identify relevant factors that affect the development of hospitals for infectious diseases and focusing on coping strategies to explore better ways for development, the research can contribute to the healthy and sustainable development of infectious disease discipline and enhance competitiveness of hospitals for infectious diseases. The research findings will provide meaningful data and scientific basis for the

formulation of policy on future development of hospitals for infectious diseases. On the other hand, it will testify the theoretical framework and theoretical hypothesis of dynamic capability and strategic alliance.

1.3 Introduction of the problem

It is inevitable that current social problems in China and the subsequent medical problems also happen in hospitals for infectious diseases. Problems in different development stages and various effects caused by policies also exist in these hospitals. The causes of these problems include insufficient investment, the policy of "covering hospital expenses with medicine revenue" and obstacles in their own development. Consequently, specialized hospitals face more difficulties then general hospitals.

For a long period in the future, the prevention and control of infectious diseases is a critical task for China's public health system construction. However, the diagnosis and treatment of infectious diseases have been treated as general medical service, without supportive policies or with limited ones. Most hospitals rely on their own businesses to maintain operation and development (Sun et al., 2011). Drug revenue is the main source of compensation for the survival and development of hospitals for infectious diseases. Due to the reform of public hospitals, the implementation of the zero-margin sale of essential drugs makes the situation even worse. Difficulties include internal factors—marketization dilemma, increasing costs, lack of human resources, and insufficient external supply—declining patient number year by year and the effect of reimbursement policy. All of these seriously constrain the development of hospitals for infectious diseases. The main task set for these hospitals is to respond to acute and major infectious diseases, but many of them lack the capacity to deal with such a situation (Chen, 2012). Still, their clinical treatment and scientific research capabilities are far behind the requirements of government and patients.

1.4 Research methods

(1) Case study. According to the comprehensiveness of data analysis, eight infectious diseases hospitals are selected as the key cases of the research, namely Shanghai Public Health Clinical Center, Chongqing Public Health Medical Center, Wuxi Fifth People's Hospital, Yancheng Second People's Hospital, Harbin Sixth People's Hospital, Shanghai

Fengxian District Guhua Hospital, The Fourth People's Hospital of Zunyi City and Shanghai Pudong New Area Infectious Diseases Hospital. Shanghai Public Health Clinical Center is selected as experimental cases. Through the interview, we are going to study the relationship between dynamic capabilities and competitive advantage.

(2) Statistical analysis. The author sets up a database with QSR NVivo 12 to conduct relevant statistical analysis.

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Chapter 2: Literature review

This chapter reviews the relevant literature on the theory of strategic management, especially the theory of resource-based theory, dynamic capability theory and strategic alliance theory. These theories will be used for researching and analyzing in the case of hospitals for infectious diseases.

2.1 Strategic management

2.1.1 Description of strategic management theory and its definition

Originally a military term especially used in a war that can be traced back to 2500 years ago, the word "*strategy"* reflects the astuteness and resourcefulness of a military strategist, a well-thought-out long-term strategy based on one's judgment and analysis of the war between the two sides. This term has been introduced into various competitive industries due to its systematic and long-term planning and design (Zhong, 2017).

After World War II, strategic management theory is an important branch of management theory. Specifically, it is an interdisciplinary field on the basis of economics, psychology, political science, anthropology, biology, and history (Zhou & Huang, 2018). The development within the last four decades has been dramatic. Strategy, as a management activity, determined to focus on the thoughts about strategy rather than on the actual application of strategy (Özleblebici, Pinto, & Antonio, 2015).

2.1.2 Development of strategic management theory

Stemmed from the United States in the 1960s, strategic management has been studied by Chinese scholars only for more than 20 years. Over the last two decades, the research on strategic management in China can be divided into three stages, which is exploring stage from 1998 to 2003, comprehensive development stage from 2004 to 2009, stable development stage from 2009-2015 (Zhen et al., 2017). Mintzberg's *strategy safari* (1998) lists ten schools, covering all aspects of strategic management, and elaborates on the academic contributions of each school in the field of strategic development since 1960.

(1) The design school

The origins of the design school can be traced back to two influential books written by Philip Selznick's *Leadership in Administration* (1957) (Selznick, 1957), and Alfred D. Chandler's *Strategy and Structure* (1962) (Chandler, 1962). Chandler established this school's notion of business strategy and its relationship to structure. Kenneth Andrews stands as the most outspoken and one of the clearest statements of this school. The design school represents the most influential view of the strategy-formation process. The famous analysis model of SWOT is the assessment of the strengths and weaknesses of the organization in light of the Opportunities and Threats in its environment (Mintzberg, Ahlstrand, & Lampel, 1998).

(2) The planning school

The planning school originated at the same time as the design school; its most influential book, *Corporate Strategy (1965)*, by H. Igor Ansoff, was published in 1965 (Ansoff, 1965). It reached a peak in the 1970s. The planning school holds that strategy formulation is a formal process. The basic strategic planning model includes five steps, the objectives-setting stage, the external audit stage, the internal audit stage, the strategy evaluation stage and the strategy operationalization stage. The four hierarchies include objectives system, budgets system, strategies system, and program system. The planning school recognizes most of the preconditions of the design school for two reasons. One is that the design school proposes a simple and informal model while the planning school reckons that strategies are plans decomposed into programs resulting from formal planning procedures. The other is that the role of chief executive officer (CEO) is not so much designing a strategy as approving it, namely, planners are playing the most important role in the strategic process. In the early 1980s, the design school also came across problems. Many companies have cut back on their strategic plans, and only a few of the perfect strategies in the planners' minds have been successfully implemented. Mintzberg proves that there are forces opposing the strategic plan (Mintzberg, Ahlstrand, & Lampel, 1998).

The context and contribution of the planning school: planners can be regarded as analysts to input data on the front end, and can also go over the formulated strategies on the back end and evaluate their feasibility, which is often overlooked by managers. The organization is well-advised to make rational use of its personnel since the planners can also act as catalysts. To be more specific, it is recommended to take advantage of planners good at creative strategic thinking in periods of uncertainty and lean on planners skilled in various formal strategic analysis when the organization is under stable condition (Mintzberg, Ahlstrand, & Lampel, 1998).

(3) The positioning school

The positioning school holds that strategy formulation is an analytical process. Specifically, Professor Michael E. Porter of Harvard Business School, the founder of positioning school, pointed out that the core of an *Competitive strategy (1980)* (Porter, 1980) is to obtain a competitive advantage, which depends on the profitability of the industry in which the enterprise is located, namely, the attractiveness of the industry and the relative competitive position of the enterprise in the industry. Therefore, the first task of strategic management is to select the industry with the most profit potential, and secondly, to consider how to position itself in the selected industry.

The development of the positioning school has reached three peaks in its history. The first heyday was military maxims. The earliest recorded strategic documents can be traced back to *The Art of War* in 400 BC (Sun, 2011) and Von Clausewitz's *On War* in the 19th century (Clausewizt, 1827). The second boom was advice-seeking. The strategic consultants are more systematic students of experience, for whom the pursuit of market share is the most significant planning. For example, Boston Consulting Group mainly employs a growth-share matrix and experience curve. The third summit was the development of the empirical proposition after the 1980s. The positioning school represented by Porter has made strategic analysis a simplified and standardized research process by creating analysis tools. In particular, the impact of industry characteristics and structures on the return on investment of enterprises helps enterprises to choose industries and formulate competitive strategies that conform to industry characteristics. Focusing on the systematic empirical research on the relationship between external conditions and internal strategies of enterprises, the positioning school has shifted the focus of strategic analysis from enterprise to industry for the first time, which underlies the enterprise's external environment. The strategic positioning model explores how to choose a clear strategy and position in the industry to exploit market imperfections. These studies concentrate on his core concepts of strategic positioning, generic strategies, Porter's five forces model and value chain analysis model There are four kinds of positioning school research, including single static research, cluster static research, single dynamic research and cluster dynamic research (Rosenberg & Ferlie, 2015).

Evaluation of positioning school: like design school and planning school, positioning school also has the defect of dissociating thinking and acting. Mintzberg holds that the positioning school's method is one-sided since it seems to prefer economics to politics, but

the strategic choice is often influenced by political factors. Second, it suffers from a limited environment due to its tendency for analyzing industries under more stable conditions. Further, it is more inclined to study the external environment from industries and competitors, ignoring the analysis of the internal factors. Third, the positioning school has also been criticized for its strategic process. Its dilemma lies in that it completes the calculation within the organization and attaches great importance to the calculation, but many factors cannot be calculated. That is to say, planners may not always gain a sound understanding of the business, and the strategies calculated by analysts who do not know the details of the business may not be accepted by the executives.

Contribution of positioning school: it provides a series of analysis techniques and powerful theoretical tools for strategic management research, such as five competitiveness models (suppliers, customers, established rivals, substitutes, and new entrants), industry attractiveness matrix, value chain analysis (Mintzberg, Ahlstrand, & Lampel, 1998).

(4) The entrepreneurial school

The entrepreneurial school stemmed from economics. Joseph Schumpeter, a pioneering figure who brought entrepreneurs to the fore in the history of economic thought, put forward the famous concept of “creative destruction” (Schumpeter, 1934). Different from the school of prescriptive strategic management such as planning school, positioning school, and design school, entrepreneurial school is more of descriptive strategic management. They belief that top leaders are the core of strategy formulation since their conception based on their strategic intuition, experience and insight can cast influence on the formulation process. In addition, vision is the pivot of entrepreneurial school and it originates from the conception of leaders. Therefore, it is determined that strategic managers need to have much more forward-looking vision than the others and become more adept with seizing opportunities and challenging traditions. They need not only prediction but also insight and creative thinking to build the future. Further, the school focuses on the study of entrepreneur personality and enterprise vision. Accordingly, its premise is that strategy derives from the intuition of enterprise leaders, and is the malleable vision of the organization’s future. In terms of organization, it is a simple organizational structure in the charge of entrepreneurs. On top of that, where the entrepreneurs stand in enterprises is able to protect enterprises from the impact of market competition.

Evaluation of the entrepreneurial school: the strategy formulated by the entrepreneurial school is completely founded on the entrepreneur's behavior and hence has not been scientifically demonstrated, which undoubtedly has certain risks.

Contribution of the entrepreneurial school: it is effective in conceiving new ideas and establishing and operating innovative organizations, and it is also significant in enthusiasm for organization investment of modern enterprises. It can be seen that it is suitable for leaders who have strong leadership and available visions to bring earth-shattering changes to the organization's operation (Mintzberg, Ahlstrand, & Lampel, 1998).

(5) The cognitive school

The cognitive school believes that strategy formulation is more of a mental process. Its premise is to conduct further in-depth research into the strategists' thoughts to explore the essence of strategy formulation through relevant knowledge of the cognitive discipline. Established in the late 1940s, the cognitive school can be represented by a scholar called Herbert A. Simon.

Contribution of cognitive school: it believes that strategy formulation is a psychological process and employs methods of cognitive psychology. The cognitive style of strategists has a great significance on their preferred strategy. Therefore, understanding how the mind distorts facts and how the mind as a whole inputs complex information is more than useful for strategy formulation. It was the first to realize that there is an external environment of the organization, namely, enterprise leaders can be expected to passively enter the established environment if they cannot lead the favorable market into the corporate vision as they wish. However, excellent strategists are creative and are able to build a new environment and put it into practice with joint efforts.

The deficiency of cognitive school: it is subjective to a certain extent and ignores the comprehensive function of experience, creative understanding and intuition, and personal understanding itself risks being distorted. Most studies of cognitive school regard strategy formulation as an individual process, so it is very difficult to study the correlation between different understandings (Mintzberg, Ahlstrand, & Lampel, 1998)

(6) The learning school

The learning school holds that strategy formulation is an emergent process. To be specific, it believes that continuous learning helps the organization to adapt to the ever-changing environment. Charles Lindblom is considered to be the pathfinder of the learning school and James Brian Quinn is regarded as the representative figure in its rise (Mintzberg, Ahlstrand, & Lampel, 1998). Nowadays, the new direction of strategy learning

is combined with learning organization, evolutionary theory, knowledge creation, dynamic capability approach and chaos theory. The learning model includes disjointed incrementalism, represented by Charles Lindblom, who believes that "Strategy formulation and implementation are linked in a continuous improvement cycle." Although James Brian Quinn recognizes this progressive view, he assumes that the core leader is able to integrate all strategic processes into a complete strategy and such complete progress is not incremental. Specifically, it is a strategy formulated through the decisions of all subsystems and eventually comes into a form in actual operation. For this reason, the opinion of James Brian Quinn is called evolutionary theory. Such logical incrementalism turns the simple adaptation of disjointed incrementalism into conscious learning, becoming the foundation of learning school.

The learning school is applied to the complex and unpredictable organizational environment. To formulate a strategy, one is required to learn continuously first. Specifically, it is believed that anyone with learning ability and resources can draft a strategy and such a draft can spring up at various times and places. These emerging strategies may become formal and deliberate strategies. The role of leaders is to manage the strategic learning process, rather than to conceive a well-thought strategy in advance. The view expressed in Prahalad and Hamel's *the Core Competence of the Corporation (1990)* holds that the "foundation" of competitive advantage comes from the core competence of enterprises and the ability rooted in organizations behind their products (Prahalad & Hamel, 1990). Learning organizations need to learn from failures, conduct continuous inspections, learn from first-hand materials, maintain information flow and acquire knowledge from outside. In the 1990s, the dynamic capability was sought-after. It is essentially "collective learning" of an organization, which can be integrated with learning schools, but it also draws on the planning school's emphasis on the overall role of senior managers in resource selection. In conclusion, the process of strategy implementation is equal to a process of collective learning and collective identification.

Evaluation of learning school: it is well suited to professional organizations. These organizations such as the hospitals are in a highly complex environment and the formulation of strategies requires an extensively broad range of knowledge. The learning school shook up the rational thought in the strategic management theory for a long time. Some scholars began to think about the problems of no strategy, losing strategy and wrong strategy. Since step-by-step efforts may lead to out-of-control results, it is recommended to learn with caution and prudence.

Contribution of learning school: being practical, it is based on simple theories and explains complex phenomena. It is crucial to realize that strategy is a learning process. Although it looks like a passive response to external forces, in fact, the organization is continuously learning and creating (Mintzberg, Ahlstrand, & Lampel, 1998).

(7) The power school

The power school considers strategy formulation as a process of negotiation and strategy as a process clearly affected by power, especially power and political factors as significant roles in the process of strategy negotiation. MacMillan was a representative figure of the power school in the 1970s, and *Strategy Formulation: Political Concepts (1978)* was one of his masterpieces (MacMillan, 1978). Power school raises strategic management to the realistic level of organizational life. Organizations are made up of different types of people. Although the strategy formulation is a process of planning analysis and cognitive learning, it is also a process of continuously coordinating different interests within and between organizations. Both private and public organizations will more or less participate in politics. There are two specific powers of this school, micro-power and macro-power. The former involves illegal political behaviors within organizations and the latter focuses on the power application by organizations. Stakeholder analysis, strategic manipulation and cooperative strategic decision-making of enterprises have been extensively studied in the field of macro-power. With the rise of cooperative relations, "network", "collective strategy", "joint venture", "strategic alliance" and "strategic outsourcing" have become new concepts of strategic management.

The premise of the power school: strategy formulation is determined by power and politics, be it internal process within the organization or the behavior of the organization itself in the external environment. Micro-power regards strategic decision-making as a political bargain in a narrow sense and does not dominate at any time while macro-power can achieve win-win results through the collective strategy of forming various networks and alliances among multiple units.

Evaluation of the power school: it overemphasizes the relationship between strategy formulation and power, ignoring leadership, culture and strategic concepts themselves. Although political factors do play a crucial role in the organization, they may also cause a lot of internal friction in the organization.

Contribution of the power school: it has introduced the terms "alliance", "political bargain" and "collective strategy" into the field of strategic management. Politics plays an influential role in strategic change (Mintzberg, Ahlstrand, & Lampel, 1998).

(8) The cultural school

The cultural school regards strategy formulation as a collective process. Speaking of culture, it is not a new concept. In the 1980s, Feldman, the representative figure of this school, put forward the significance of culture on strategic change. Barney (1986) studies whether culture is a source of maintaining a competitive advantage. Culture has attracted the attention of the management circle because it can unite all individuals into a whole and then form an organization. Then it comes to the organizational culture, which represents the vitality and soul of an organization. The hypothesis of the cultural school is that strategy formulation is based on the same beliefs of the organization members. Although it is sometimes formally instilled through the organization, most of it is still subtle. The cultural school believes that the strategy based on ideology can bring competitive advantages to the organization, and successful enterprises will be dominated by the core values of the organization. It can be seen that culture affects the thinking style and analytical methods used in the organization, and also affects the strategy formulation. Due to the culture founded on the common beliefs of employees, it is not conducive to changes in organizational strategy. Therefore, scholars from the cultural school proposed that senior managers should adopt flexibility and innovation as the most important component of organizational culture to overcome the obstacles caused by cultural conflicts in strategic changes (Barney, 1986).

Another theory of cultural school is resources as the basis of competitive advantage. *A Resource-based View of the Firm* (Wernerfelt, 1984) is the most influential thesis on firm resources before 1990 (Wernerfelt, 1995) and was only recognized when Prahalad and Hamel promoted the concept of dynamic capability. As for Barney, he developed the resource-based view into a full theory.

Evaluation of the cultural school: it is obviously applicable to organizations with historical and cultural accumulation since their inherent culture has consolidated the long-term strategy of the organization. It is also possible that the cultural school helps the collective form new ideas. On the other hand, some scholars are believing that the shortcoming of cultural school is the ambiguity of concept. Another disadvantage is that it hinders the organization from making necessary changes to a certain extent on account of stable and lasting culture. The cultural school gave a very simple explanation of the existing phenomenon but did not deal with some problems that will happen and are more difficult to solve.

Contribution of cultural school: it holds that strategy formulation becomes the management of collective cognition, which is a significant point of view (Mintzberg, Ahlstrand, & Lampel, 1998).

(9) The environmental school

The environmental school considers strategy formulation as a reactive process. It first put forward the contingency theory, which describes the relationship between a specific environment and the special attributes of an organization. In addition, it also takes the environment as an actor and the organization a passive recipient. Only when the external environment changes, the organization will deal with such changes. Therefore, the process of formulating a strategy is seen as a process of mapping out the outside. The environmental school holds that in the process of strategy formulation, environment, leadership, and organization are the three central forces, and environment is in the dominant position. Hannan and Freeman are the representatives of the environmental school, who mainly study the results of organizational evolution, changes in organizational population and environmental selection.

Evaluation of the environmental school: the biggest weakness of the contingency theory of the environmental school is that its scope is too abstract, and strategies must help organizations to choose specific positions.

Contribution of environmental school: it forces people engaged in strategic management to consider the scope of various effective decisive forces and determine the strength and requirements of these external environments. In addition, it also helps to describe various aspects of strategists' environment and point out their possible influence on strategy formation. As a matter of fact, the external scope of strategic adaptation is extremely broad, leaving a lot of room for organizational strategy (Mintzberg, Ahlstrand, & Lampel, 1998).

(10) The configuration school

The configuration school thinks that strategy formulation is a process of transformation. Its fundamental difference with other schools lies in that it provides a possibility of reconciliation and a method of integrating the viewpoints of all other schools. There are two definitions of this school. One is configuration, which describes the state of an organization and its surroundings. The second is change, which describes the process of strategy formulation. Since 1960s, Alfred D. Chandler, Pradip Khandwalla, Mintzberg, Miller and Porter are the representative figures of the configuration school, put forward the significance of culture on strategic change. Changes can be rapid or revolutionary.

Lumping is widely used in strategic management, reflecting the close connection between theory and practice. The origins of the whole field of strategic management, as well as this school, can be traced back to 1962 pathbreaking book by the business historian, Alfred D. Chandler, entitled *Strategy and Structure: Chapters in the History of the Industrial Enterprise* (Chandler, 1962).

Configuration studies can also assist in further exploration of major changes in the organization. Its large amount of culture can be adopted to help managers deal with major organizational changes, and three kinds of change methods are proposed: planned change, driven change and deepening change.

Contribution of the configuration school: although Lex Donaldson has made sharp criticism on it and all theories are not perfect, configuration school still makes a great contribution to strategic management. It provides a way to reconcile different schools and achieves a dynamic balance by selecting an appropriate structural degree.

Generally speaking, the ten strategic theory schools can be divided into the school of prescriptive strategic management (planning school, design school, positioning school) and the school of descriptive strategic management (entrepreneurial school, cognitive school, learning school, power school, cultural school, environmental school, and configuration school). The deepening of various schools is an organic whole that grows and develops continuously: from the early days of strategic management in the 1960s, to the rapid development of the planning school in the 1970s and the positioning school in the 1980s, to the emergence of more than one school in the 1990s, to the diverse and different schools now, the compatibility of strategic theories is stronger. The strategy is also a whole in essence, and diverse roles among various schools provide methods for achieving different goals (Mintzberg, Ahlstrand, & Lampel, 1998)

2.2 Related strategic management theories

2.2.1 Resource-based view (RBV) and dynamic capabilities theory (DCT)

(1) Resource-based view

A Resource-based View of the Firm (Wernerfelt, 1984) is the most influential thesis on firm resources before 1990 (Wernerfelt, 1995). In his opinion, organizational resources, capability, knowledge and other internal conditions are the key elements for enterprises to obtain excess profits and maintain competitive advantage (Wernerfelt, 1984). Since then,

many academic types of research on resources have been categorized as resource-based view of firm. Scholars like Wernerfelt, Rumelt, Barney, Montgomery, Collis and Lippman have made contributions to this field (Liu & Ji, 2009).

Barney is generally considered to be the first scholar to develop the resource-based view (Newbert, 2008). Firms' combination of resources and capabilities provide a competitive advantage as long as they are valuable and rare, and for such advantage to be sustainable, they must be costly to imitate and nonsubstitutable. RBV argues that resources that are simultaneously valuable, rare, imperfectly imitable and imperfectly substitutable are a source of competitive advantage (Barney, 1991).

If firms want to have the potential to sustain competitive advantages, their resources must be valuable, rare, imperfectly imitable and non-substitutable (VRIN). In the present studies, a firm is deemed to boost competitive advantage if it is able to create greater economic value than the marginal competitors in its product market (Peteraf & Barney, 2003). Peteraf and Barney (2003) believe that competitive advantage comes from the key resources which are used in better ways. The application of these resources means a new approach that is how to change resources into competitive advantages. According to the VRIO (value, rarity, inimitability and organization) theory, resources are converted into competitive advantages through the internal organizational structure (Barney, 1995). Cardeal, Abecassis-Moedas, and António (2012) argue that "O" in invaluable, rare, inimitable resources and organization (VRIO) refers to dynamic capabilities (DC) instead of the organization. They concluded that none of the resources contributing to the capability are VRIO, but the capability is VRI (value, rarity, imitability).

(2) Dynamic capabilities theory

DCT have become a hot topic in the strategic management and organizational change fields since the concept was first introduced by David Teece and his co-authors in 1997 (Teece, Pisano, & Shuen, 1997). Teece, Pisano, and Shuen (1997) provide an original definition: **the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments**. Eisenhardt and Martin (2000) define DC as "the firm's processes that use resources which are specifically the processes to integrate, reconfigure, gain and release resources to match and create market change". Winter (2003) defines DC as "are those that operate to extend, modify or create ordinary capabilities". Wang and Ahmed (2007) define DC as a firm's behavioral orientation constantly to integrate, reconfigure, renew and recreate its resources and capabilities and,

most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage.

At the beginning of the 1990s, with the development of strategic management theory, scholars and entrepreneurs reflected upon and complemented the deficiencies in the enterprise capabilities theory, during which the DCT was gradually developed as a branch. Different from conventional enterprise capabilities theories, DCT gradually transfers the focus from market conditions and the characteristics of resources and capabilities which strengthen a company's competitive advantage, to the emergence, development and evolution of VRIN resources. It emphasizes adapting capabilities to the environment.

RBV is static when explaining enterprise competitive advantage. Nonetheless, since the 1990s, due to the rapid changes in technology and market, enterprises have been facing uncertainties in the environment. In such a rapidly-changing environment, the changes in technology, innovation and consumer preference can eliminate an enterprise's competitive advantage. Besides, from the moment when a competitive advantage is established, the enterprise is under the strong destructive impact of its imitators and innovators. Therefore, it cannot maintain the advantage forever, but only before its competitors imitate successfully or surpass it. The long-term success and solid foundation of enterprises do not depend upon their short-term competitive advantages at some point. With the arrival of the era of knowledge-driven economy, people witness the daily changes of science and technology, they gradually realize that core competence is inflexible, thus making it difficult for enterprises to adapt to the changing environment. In such a dynamic environment, the core competence cannot help maintain enterprises' competitive advantages forever (Liu & Ji, 2009).

(3) The comparison of RBV and DCT

Correlation between RBV and DCT. The RBV has made an important contribution to the theory of strategic management. DCT originates from RBV, and in the early stage of theoretical development, RBV plays a great role in promoting the development of DCT. Since then, DCT has absorbed useful achievements from RBV and developed rapidly. The interaction between DCT and RBV is often used alternately, but it also leads to contradictory results in the verification of similar propositions by different authors due to the difficulty in defining concepts (Jiang & Ma, 2009). Collis and Montgomery (2008) believe that RBV is the cornerstone of DCT, which is also formed by the bundle of

resources. If the DC of the enterprise change, the resource portfolio of the firm will also change. In recent years, the frequency of DCT is on the rise.

The difference between the RBV and the DCT. DCT is more of the learning school and emphasizes that capability is mainly formed through a strategic learning process, while the RBV belongs to the cultural school and underlies that ability is the root characteristic in the process of organizational evolution. Therefore, DCT is more popular with consultants and practicing managers，while the audiences of the RBV is scholars of studying strategy (Mintzberg, Ahlstrand, & Lampel, 1998). Barney (1986) takes culture as the most effective and strongest fortress to cope with imitation for two reasons: culture creates unique products, and cultivation has causal ambiguity. Different from RBV, DCT believes that resources and capabilities are clearly distinguished from each other, and that the source of competitive advantage is the environment of DC. Therefore, this theory emphasizes capabilities instead of resources, because resources are rapidly depreciated in the environment of dynamic market (Collis & Montgomery, 2008).

2.2.2 Strategic alliances

The concept of Strategic Alliances (SAs) was first put forward by J Hopland and R Nigel (Yang, Zhang, & Yang, 2009). Since the 1990s, due to the rapid development of the theory of SAs and its extensive and profound influence, this theory has attracted keen attention from scholars and entrepreneurs. SAs have become an important perspective on strategic management theory and practice. Bhattacharyya (2019) develops an integrated framework on SAs based the strategic management theories, such as RBV, Industrial Organization Theory, DCT, agency theory, transaction cost economics and stakeholder theory. Scholars have carried out theoretical discussions on the emergence of the theory with a wide range of theories, including the RBV, transaction cost economics, resource dependence theory, shareholder theory, institutional theory, strategic choice theory and learning theory. All the schools have profoundly discussed the emergence of the alliance from different perspectives (Zhang, Liu, & Li, 2003).

Strategic management theory takes competition as its primary logic and holds that enterprises obtain competitive advantages through competing as rivals. Then, with the recognition of the internal defects of rival competition and the need for meeting the challenges of external changes, the theory of SAs gradually emerges. Strategic alliances refer to a relationship between two or more enterprises (or between a particular business

division and functional department) with equal business capabilities, formed to realize the goal of sharing a market and resources based on their expectations of the entire market as well as the overall business objectives and operation risks. It is a loose network organization formed by contract, aiming for a synergy of advantages, shared risks and two-way or multi-way flow of factors (Zhu, 2001). In recent years, strategic alliance theory has been getting more and more attention from many hospitals, and many hospitals build SAs through network and alliance patterns. Hospital strategic alliances refer to hospital alliances formed by two or more hospitals through specific agreements or joint organizations for specific strategic purposes in order to exert brand and scale effects, reduce medical costs, enhance comprehensive competitiveness and expand the medical market (Wan, Shi, & Du, 2012). The essence of the alliance is that the hospitals combine contractually into a loose organizational cooperation model with complementary advantages, resource sharing and two-way information flow, which is an important strategic form for hospitals to gain competitive advantages. The strategic alliance is a crucial means to increase the core competitiveness of hospitals. *Opinions of the Central Committee of the Communist Party of China on Deepening Reform of the Medical and Health Care System* (Wan, Shi, & Du, 2012) pointed out: Efforts should be made to make full use of and optimize the distribution of existing health care resources, gradually integrate and consolidate health care institutions that are inconsistent with requirements of relevant plans, strictly control the deployment of large-sized medical equipment, encourage joint construction and sharing, and enhance the utilization efficiency of medical and health resources. The hospital strategic alliances can realize the resource sharing, alleviate the uneven resource allocation and accelerate rational allocation and utilization, so that the hospitals can concentrate limited human resources, material resources, financial resources and other strategic resources to focus on the construction of its core capabilities, creating core capabilities and brand advantages (Wan, Shi, & Du, 2012).

2.3 The definition and nature of dynamic capabilities (DC)

The concept of DC has evolved from the RBV of the firm (Ambrosini & Bowman, 2009). Early statements of the DC framework can be found in Teece et al. (Teece, Pisano, & Shuen, 1990, 1997). The view of DC dates back to the early 1990s, Teece and Pisano (1994) refer to this as the DC approach, recognizing it as a part of the overall resource-based perspective. Teece, Pisano, and Shuen (1997) put forward for the first time

the notion of DC which is the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. DC is also defined that one element of DC is that they govern the rate of change of ordinary capabilities (Teece & Pisano, 1994; Winter, 2003; Helfat et al., 2007). DC can be divided into three parts: (1) sensing (the identification and assessment of opportunities), (2) seizing (the mobilization of resources internally and externally to capture opportunities and value), and (3) transforming (continued renewal of the organization) (Teece, 2007). DC define the firm's capability to innovate, adapt to change, and create change that is favorable to customers and unfavorable to competitors (Teece, Peteraf, & Leih, 2016). They classify the nature of the concept as being a capability, emphasizing the fundamental role of strategic management. They emphasized that DC are heterogeneous across firms because they depended on firm-specific paths, unique resources, and distinctive processes. Their approach makes it clear that sustained competitive advantage is a direct result of DC. Based on previous studies on DC, Barreto (2009) suggests the following definition of DC, "a potential DC is the firm's system to solve problems, by its opportunities and threats, tend to make decisions in time and market-oriented, and to change its resource base." (Barreto, 2009).

Since the definition by Teece cannot resolve the formation and development of DC, Zollo and Winter (1999) define DC of firm as "a kind of stable pattern for group activity obtained through learning from the perspective of learning and organizational knowledge evolution. With DC, a firm can systematically create and adapt its operational routines to improve its efficiency". This definition is now widely accepted.

Helfat et al. (2007) argue that "the capacity of an organization to purposefully extend, create, or modify its resource base," emphasizing the intentional, or purposeful element in capabilities. This definition is precise enough to allow scholars to learn more about the nature and origins of DC (Smith, Lyles, & Peteraf, 2009). Identifying DC is foremost upon the firm's resource base, including both tangible and intangible assets and capabilities. The firm has not enough resources but can make a Strategic Alliance in order to build the DC.

Eisenhardt and Martin (2000) believe that DC present different characteristics in two types of markets: moderately dynamic markets and high-velocity markets, where changes are non-linear and difficult to predict, market boundaries are unclear and industry structures are vague and constantly changing. Therefore, the focus of DC is on the fast-changing environment, especially new knowledge. Firms must also combine the

exploration of new opportunities with exploitation and innovation. Developing decision-making skills and organizational processes to perceive and seize opportunities is a basic managerial function in the DC's framework (Augier & Teece, 2009). Absorptive capability is a multi-dimensional structure. Four elements of the absorptive capability structure are knowledge acquisition, absorption, transformation and exploitation. The firm's management systems should encourage people to challenge outdated traditions, practices, enabling the firm to respond quickly to changes in the market and to grow rapidly in response to changes in business priorities. The stronger the enterprise's absorptive capability, the stronger its DC. Innovation capability refers to a firm's ability to develop new products or markets by combining strategic innovation orientation with innovation behaviors and processes. Absorptive capability emphasizes the importance of absorbing external knowledge and combining it with internal knowledge for internal use (Wang & Ahmed, 2007).

A firm with strong DC can flesh out the details of strategic intentions and implement strategic actions quickly and effectively. A strategy is a coherent set of analyses, concepts, policies, arguments, and actions to address high-risk challenges. For Rumelt, a good strategy has (1) diagnosis, (2) guiding policy, (3) coherent action. Rumelt's tripartite method interacts with the three DC: perception, capture and transformation (Rumelt, 2011). Both strategy and DC occur within business lines and across the firm. The approach of DC integrates strategy and organizational design issues to show how the firm can align with, and sometimes shape the business environment. DC's function includes the following three aspects: coordination and integration of internal and external production resources; To work together to learn and create organizational knowledge, modify operating procedures and activity patterns; And the resources are reconstructed to achieve internal and external changes to adapt to the dynamic environment. Therefore, DC provides a new and unique perspective to explore the source of enterprise competitive advantage (Peng & Ji, 2008).

Strategic alliances provide firms with the opportunity to develop and construct DC and the ability to redeploy or expand their existing resources. Therefore, once the strategic alliance is properly managed and has a clear structure and purpose, it can help firms gain sustainable competitive advantage. Strategic alliances can be a strategic choice that enables companies to cope with an unstable and global competitive environment full of threats and opportunities (Mamédio et al., 2019). In summary, the emergence of DC enhances the RBV, because it addresses that the evolutionary nature of firm resources and capabilities

related to environmental changes and can identify of firm-specific processes that are critical to firm evolution.

The summary of the definition about dynamic capabilities is shown in Table 2-1.

Table 2-1 The summary of the definition about dynamic capabilities

Scholars	Definition
Teece, Pisano, and Shuen (1997)	The firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments.
Zollo and Winter (1999)	DC as a kind of stable pattern for group activity obtained through learning from the perspective of learning and organizational knowledge evolution. With DC, a firm can systematically create and adapt its operational routines to improve its efficiency.
Eisenhardt and Martin (2000)	The firm’s processes that use resources–specifically the processes to integrate, reconfigure, gain and release resources–to match and even create market change and the organizational and strategic routines by which firms achieve new resources and configurations as markets emerge, collide, split, evolve, and die. A firm’s DC’ focus is on fast-changing environment, especially new knowledge.
Collins (1994); Winter (2003); Helfat et al. (2007)	One element of DC is that they govern the rate of change of ordinary capabilities.
Winter (2003)	DC as are those that operate to extend, modify or create ordinary capabilities.
Wang and Ahmed (2007)	DC are a firm’s behavioral orientation constantly to integrate, reconfigure, renew and recreate its resources and capabilities. Most importantly, DC can upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage.
Teece (2007)	DC can be divided into three parts: sensing, seizing and transforming.
Peng and Ji (2008)	DC’s function includes the following three aspects: coordination and integration of internal and external production resources.
Augier and Teece (2009)	Developing decision-making skills and organizational processes to perceive and seize opportunities is a basic managerial function in the DC framework.
Barreto (2009)	DC are the firm’s system to solve problems, by its opportunities and threats, tend to make decisions in time and market-oriented, and to change its resource base.

Scholars	Definition
Teece, Peteraf, and Leih (2016)	DC define the firm's capability to innovate, adapt to change, and create change that is favorable to customers and unfavorable to competitors.

2.4 The relevant factors of DC

The fields of DC span the strategic process, content, and involves multiple levels of analysis, from management decision-making, organizational practices to competitive interactions and environmental changes (Smith, Lyles, & Peteraf, 2009). In terms of its specific role, earlier research tended to consider DC as changes in resources, capabilities, operating routines, or a combination of those changes. More recently, other specific roles have been added, such as decision-making capability or the capability to perceive opportunities and threats.

(1) Strategy-making process capability is a key DC. The top managers are responsible for strategy formulation and have decision-making power. They are shaped by the firm's unique history, values and practices (Teece, 2012) and enable the firm to change its activities as the business environment changes, which are essential to change resource bases, and related DC. The design of new business models needs to pay attention to balance customer requirements and technological possibilities, and keep in line with an overall logic of the organization (Teece, Peteraf, & Leih, 2016). Strong DC require transformational leadership and a flexible organization. The ability to sense the need for business model changes is critical. The ability to modify or completely redesign the business model is critical. Winter and Sidney (2003) suggest that DC should be primarily defined around high-level routines. The top managers must define goals, help evaluate opportunities, built culture and trust, play a key role in strategic decisions. Kor and Mesko (2013) develop the theory on the interaction between the firm's dominant logic and dynamic managerial capabilities, which is helpful to understand the dynamic management ability of top management teams. They propose a theory on the distributed nature of organizational renewal efforts, in which the coordination of dynamic managerial capabilities of CEO will promote the ability to revitalize the firm's dominant logic and to achieve evolutionary adaption.

(2) DC recognize that culture is critical to the efficient and effective functioning of business organizations. The framework of the DC points to the importance of a

high-level of internal collaboration supported by an open and knowledge-based culture (Leih, Linden, & Teece, 2015).

(3) Entrepreneurial management also plays an important role in the DC framework. Successfully managing value creation, delivery, and capture is a key DC. Understanding DC will require more analysis of the various organizational design aspects of value creation and capture. Ambrosini and Bowman (2009) suggest that there are three levels of DC related to the manager's perception of environmental dynamism. The first level is incremental DC. The second level is the ability to update DC. The third level is regenerative DC. In addition, the experts are key employees whose management requires limited hierarchy, flexible teams, and performance-based incentives. Management involves not only motivating people and ensuring work gets done, but also a strategic component of what resources to use and where to get them. Human resources are firm-specific assets that are difficult or impossible to imitate.

The summary of the relevant factor of dynamic capability is show in Table 2-2.

Table 2-2 The summary of the relevant factor of dynamic capability

Scholars	Relevant factor
Smith, Lyles, and Peteraf (2009)	Resources, management decision-making, organizational practices and environmental changes.
Barreto (2009)	Decision-making abilities, the ability to perceive opportunities and threats.
Teece (2012)	Strategy-making process capability.
Leih, Linden, and Teece (2015)	(1) Balance customer requirements and technological possibilities. (2) Need transformational leadership and a flexible organization. (3) The ability to sense the need for business model changes is critical. (4) The top managers must define goals, help evaluate opportunities, built culture and trust, play a key role in strategic decisions. (5) Culture.
Kor and Mesko (2013)	The coordination of dynamic managerial capabilities of CEO.
Ambrosini and Bowman (2009)	Manager's perception of environmental dynamism, flexible teams, performance-based incentives and innovation.

2.5 Critical views of DC

The DC has become a hot topic in the strategic management and organizational change. However, scholars in the field remain controversial view.

First, many scholars have defined DC, but there is no relatively fixed definition, which causes some confusion. Barreto (2009) suggests the concept of DC needs to be considered before further research, and that appropriate assumptions, variables, and relationships should be ensured. Despite the wide application of DC, a generally accepted definition has been slow to emerge (Smith, Lyles, & Peteraf, 2009).

Second, the rapid growth of the DC literature seems rich but incoherent. This field needs a review and criticism, which can provide relevant guidance for future research not only on the main structure, but add the relations and boundary conditions.

Third, although there is a lot of literature on DC, this approach has received some important criticisms. They are difficult to measure empirically, as the underlying operational processes and the relationship between DC and firm performance.

Fourth, the effects and consequences of DC vary in the literature. Early recommendations in this field explicitly assumed a direct relationship between firms' DC and their performance (Teece, Pisano, & Shuen, 1997). These authors point out that this framework aims to explain firm-level success and failure, competitive advantage. Teece (2007) reiterates that DC are the core of enterprise success. Zollo and Winter (2002) study the mechanism of organizational DC development. It is thought that DC is formed by the co-evolution of these learning mechanisms. Some scholars lack confidence in the mandatory and direct link between DC and performance. Eisenhardt and Martin (2000) argue that DC cannot be the source of competitive advantage or superior enterprise performance. The consensus will impede progress on concepts. The framework of DC is still in its infancy. Much remains to be learned about the underlying mechanisms, processes, and intermediate outcomes associated with DC.

The summary of the critical views of dynamic capability is shown in Table 2-3.

Table 2-3 The summary of the critical views of dynamic capability

Order	**Critical views**
1	There is no relatively fixed definition, which causes some confusion. Despite the wide application of the DC, a generally accepted definition has been slow to emerge.
2	The rapid growth of the DC literature seems rich but incoherent.

3	The approaches are difficult to measure empirically, as the underling operational processes and the relationship between DC and firm performance.
4	Effects and consequences of the DC vary in the literature. The framework of the DC is still in its infancy.

2.6 Empirical research progress of western scholars

There is an increasing attention and numerous conceptual frameworks and propositions about DC, but empirical studies are limited. Some viewpoints argue that resources, DC, and knowledge are closely interlinked. The application fields of RBV and DCT are mainly in human resource management, economics and finance, entrepreneurship, marketing, international business (Barney, Wright, & David, 2001). The literature about the DC of hospital strategic development are relatively new. The hospital business environment has changed over the past decade, so DC are also closely relevant and needed for hospitals (Agwunobi & Osborne, 2016).

Jantunen et al. (2005) explore the impact of entrepreneurial orientation and a firm's reconfiguration capabilities on international performance. Their findings show that a firm's entrepreneurial orientation and reconfiguration capabilities have an impact on the international performance, and provide empirical support for the DC. The combination of entrepreneurial behavior and organizational restructuring capabilities constitutes a potential source of competitive advantage.

Menguc and Auh (2006) study the DC-generating capability of market orientation on firm performance. Their research uses an internal approach that focuses on existing resource stocks within companies while controlling environmental conditions. This empirical result supports that when market orientation is tied with internal complementary resources, the influence of market orientation on enterprise performance is enhanced.

Ridder, Doege, and Martini (2007) use the DC approach to examine the implementation effect of diagnosis-related groups in a German hospital group and to explain why some clinical departments gain competitive advantage while some others do not.

Hung et al. (2010) conduct an empirical study utilizes survey data from a Taiwan high-tech industry to examine a comprehensive model of DC. The results of this study show that although organizational learning culture has a significant impact on performance,

its impact is mediated by DC. This study supports the hypothesis that process consistency directly or indirectly affects performance through DC.

Danneels (2011) adopts the extended case method to advance the DCT by confronting it with an empirical case. This case provides rich insights into the process of resource change in the operation of DC, and highlights resource cognition is a missing element in DCT.

Cardeal and António (2012) use a multiple case study approach to analyze how three small and medium sized firms (Portuguese footwear manufacturers) belonging to the same cluster. It is based on a larger study that identifies how DC can be a source of the competitive advantage.

Agwunobi and Osborne (2016) describe how hospitals use the DC to gain competitive advantage in today's drastic healthcare environment. It provides a template for understanding how to focus on creating lasting competitive advantage, and it illustrates the specific reasons for the mismatch between the leadership skills of a hospital and the needs of a business environment characterized by increased competition and uncertainty.

Dobrzykowski, McFadden, and Vonderembse (2016) develop a model for improving financial performance and patient safety in hospitals based on DC. Results indicate that impacts financial performance indirectly through internal integration, although a comprehensive lean orientation has a direct and positive impact on patient safety. The findings have important implications for strengthening patient safety and financial performance in healthcare services and improving the operations of professional services more generally.

Wooten and Crane (2016) claim that strategic management research overlooks DC generated from the humanistic side. They conducted a study of a nurse-midwife practice in a large research hospital. This research project explored how the humanistic behavior generated by the extraordinary work ideology of the nurse-midwife practice creates DC.

Mandal (2016) uses a mixed-method case study on the Amazon Web Services (AMS) ecosystem to provide an in-depth understanding of its sensing, seizing and transforming capabilities. This study encourages managers to critically assess their own maturity levels and complements the DC interpretation to facilitate business by implementing perception, capture, transformation and innovation capabilities.

Garmann and Eikebrokk (2017) contribute to e-health research by identifying the key factors that influence performance based on the DCT. These factors are greatly influenced by government policies and regulations.

Wang and Byrd (2017) examine the mechanisms by which business analytics capabilities in healthcare units indirectly influence decision-making effectiveness by using the RBV and DCT. Healthcare units may use effective data analysis and interpretation tools in order to obtain valuable knowledge. The effective use of data analysis tools in healthcare units indirectly affect the effectiveness of decision-making, and an impact is mediated by absorptive capacity.

Raymond, Paré, and ÉRaymond (2017) claim that increasing uncertain environment requires firms to develop greater absorptive capacity and organizational learning capability which is emanating from the RBV and DCT. This could be done by means of a mixed-methods study to empirically test if one wishes to maximize their contribution to knowledge management research and practice in primary health care settings.

Khatri, Gupta, and Varma (2017) develop a multidimensional structure of human resource capabilities (HR) and tested its relationship with quality of patient care with the sample of American hospitals based on RBV, DC and behavioral perspective. The results support the DCT. HR capabilities may help organizations improve the quality of their services and HR capabilities are particularly important in a highly people-intensive service industry, such as hospitals.

Najmi, Kadir, and Kadir (2018) aim to examine and evaluate the effect of knowledge management and strategic leadership on hospital performance by using the mediating effect of DC variable. This study attempts to further fill this gap by examining the impact of knowledge management on the DC and organizational performance of hospitals.

Vogus and Rerup (2018) discuss the methodological significance of applying high-reliability organization method to study strategic organization and how to expand and enrich high reliability study. They draw on the perspective of high-reliability organizations to show how leaders support more strategic front line through practices and behaviors. The everyday work of front-line operations is an important source of potential opportunities and threats that constitute superior relative performance.

Teece (2018) has highlighted some of the important interactions between a firm's business models and its DC. A key conclusion is that to be a source of competitive advantage, a business model must meet specific customer requirements. It requires

inimitable, difficult to replicate. Good business model design and implementation involves evaluating internal and external factors related to customers, suppliers and the broader business environment.

Uner, Cetin, and Cavusgil (2020) report a study of large private hospital operators in emerging economies in Turkey. They draw on DCT to explain their success in fostering international market opportunities. They believe that companies that have traditionally focused on the domestic market need multiple organizational capabilities to expand internationally.

The above examples of empirical research progress on dynamic capability are shown in Table 2-4.

Table 2-4 Examples of empirical research progress on dynamic capability

Author (s)	Theoretical viewpoints	Research conclusions
Jantunen et al. (2005)	DCT	A firm's entrepreneurial orientation and reconfiguration capabilities have an impact on the international performance. The combination of entrepreneurial behavior and organizational restructuring capabilities constitutes a potential source of competitive advantage.
Menguc and Auh (2006)	DCT	This empirical result supports that when market orientation is tied with internal complementary resources, the influence of market orientation on enterprise performance is enhanced.
Ridder, Doege, and Martini (2007)	DCT	This study is relevant with management practice. Hospitals aim to implement DRGs to gain competitive environment. There is an important relevance of change resources in change processes. They identified different implementation processes according to the history of a hospital and their judgement of the environment, and deepened understanding of learning, coordination, and reconfiguration.
Hung et al. (2010)	DCT	The organizational learning culture has a significant impact on performance, its impact is mediated by DC. The process consistency directly or indirectly affects performance through DC.
Danneels (2011)	DCT	The process of resource change in the operation of DC,

Author (s)	Theoretical viewpoints	Research conclusions
		and highlights resource cognition is a missing element in DCT.
Cardeal and António (2012)	DCT	This study analyzes how 3 small and medium-sized enterprises (Portuguese shoe manufacturers) belonging to the same cluster but with different business models develop cluster resources. The conclusion is that cluster enterprises use non-strategic which are shared resources in a similar way and for the same purpose. Strategic resources are related to a company's business model, and each company uses strategic resources for different purposes.
Agwunobi and Osborne (2016)	DCT	It provides a template for understanding how to focus on creating lasting competitive advantage, and it illustrates the specific reasons for the mismatch between the typical capabilities/leadership skills of a hospital and the needs of a business environment characterized by increased competition and uncertainty.
Dobrzykowski, McFadden, and Vonderembse (2016)	DCT	Results indicate that impacts financial performance indirectly through internal integration, although a comprehensive lean orientation has a direct and positive impact on patient safety. The findings have important implications for strengthening patient safety and financial performance in healthcare services and improving the operations of professional services more generally.
Wooten and Crane (2016)	DCT	Strategic management research overlooks DC generated from the humanistic side. This research project explored how the humanistic behavior generated by the ideology of the nurse-midwife practice creates DC.
Mandal (2016)	DCT	This study studies the impact of hospital's DC on its collaborative efforts with its key supplier and their influence on hospital supply chain performance. This study explores the importance of technology orientation on hospital-supplier collaboration and hospital DC. An important contribution of this study is to conceptualize the

Author (s)	Theoretical viewpoints	Research conclusions
		core components of supply chain visibility in the context of hospital supply chains.
Garmann-Johnsen and Eikebrokk (2017)	DCT	The study contributes to e-health research by identifying the key factors that influence performance based on the DCT. These factors are greatly influenced by government policies and regulations. The concepts that influence performance mainly lies in policy analysis, structures, digital information infrastructure, organization's processes, organizational learning, alliance orientation.
Rudolph (2017)	DCT	This study encourages managers to critically assess their own maturity levels and complements the DC interpretation to facilitate business by implementing perception, capture, transformation and innovation capabilities.
Wang and Byrd (2017)	RBV and DCT	Healthcare units may use effective data analysis and interpretation tools in order to obtain valuable knowledge. The effective use of data analysis tools in healthcare units indirectly affects the effectiveness of decision-making, and an impact is mediated by absorptive capacity.
Raymond, Paré, and ÉRaymond (2017)	Absorptive Capability Theory	Firms need to develop greater absorptive capacity and organizational learning capability to deal with increasing uncertain environment. This could be done by means of a mixed-methods study to empirically test if one wishes to maximize their contribution to knowledge management research and practice in primary health care settings.
Vogus and Rerup (2017)	DCT	They design the perspective of high-reliability organizations to show how leaders support more strategic front line through practices and behaviors. The everyday work of front-line operations is an important source of potential opportunities and threats that constitute superior relative performance.
Khatri, Gupta, and Varma (2017)	RBV, DCT and	They develop a multidimensional structure of HR capabilities and tested its relationship with quality of

Author (s)	Theoretical viewpoints	Research conclusions
	behavioral perspective	patient care with the sample of American hospitals. The results support the theory of DC. HR capabilities may help organizations improve the quality of their services and HR capabilities are particularly important in a highly people-intensive service industry, such as hospitals.
Najmi, Kadir, and Kadir (2018)	Knowledge management theory and DCT	This study examines and evaluates the effect of knowledge management and strategic leadership on hospital performance by using the mediating effect of DC variable.
Teece (2018)	DCT	To be a source of competitive advantage, a business model must meet specific customer requirements. In some ways, it must also be difficult to imitable.
Uner, Cetin, and Cavusgil (2020)	DCT	They explain the success of the firms have had in cultivating international market opportunities from DC perspective. It takes a variety of organizational capabilities for traditionally domestic-market focused firms to expand into international markets.

2.7 Empirical research progress of Chinese scholars

Chinese scholars began to join the research in the field of DC after 2002 (Meng & Li, 2018).

For the first time in China, the RBV and the DCT were integrated into a research framework, and a theoretical model was constructed (Dong, Ge, & Wang, 2011). The structural equation model (SEM) was employed to empirically analyze 187 valid questionnaires in Northeast China. The contribution of this research lies in demonstrating that DC play a full intermediary role in the relationship between the external resource acquisition process and competitive advantages of the enterprise, and it plays a partial intermediary role in the relationship between the resource allocation process and the competitive advantages of the enterprise. Its practical significance lies in how enterprises should enhance their DC and thereby enhance their competitive advantages and participate in market competition.

Liu (2011) has explored the impact model of new start-ups' performance with entrepreneurial learning and DC as key elements, and sorted out the hierarchical relationship and mechanism of entrepreneurial learning, DC and new start-ups' performance. The empirical research makes a comparative analysis of new start-ups and mature enterprises and the results show that entrepreneurial learning and DC have a significant effect on the performance of new start-ups. Their effectiveness and explanatory power are higher than those of mature enterprises. And environmental dynamics has a regulating effect on this relationship.

Jiao (2011) and Fu et al. (2016) examine the mechanisms and routes for building dual organizations through utilization innovation and exploratory innovation to improve short-term financial performance and long-term competitive advantages based on the DCT in the field of organizational strategic management through empirical research.

Wu and Hu (2012) propose a new research model to explore the interaction between knowledge management enabled performance for hospital professionals based on the DCT. This model includes an interaction between hospital knowledge assets and capabilities, hospital process capabilities, and hospital performance. The empirical results show that the knowledge management-enabled performance model is consistent with these factors, and in terms of providing high-quality care, hospital professionals are closely related to the performance mediated by knowledge management.

Jin and Chen (2015) use the empirical data from 214 Chinese knowledge-intensive service companies and an empirical model of knowledge source strategy, DC and exploratory innovation performance, the breadth and depth of knowledge sources were empirically tested, and it also verified how their balance can affect enterprises' exploratory innovation performance, and how can DC play an intermediary and regulatory role in the relationship between breadth and depth of knowledge sources and exploratory innovation performance.

Tang, Liu, and Xiao (2015) analyze the mechanism of transformation process from the perspective of DC and it is believed that the DC in the context of transformation are composed of environmental insight, planning and design capabilities, organizational learning and change leadership. They propose a strategic transformation process mechanism model from the perspective of DC, and describes the relationship and role route of each dimension of the model.

Ma, Song, and Ge (2015) based on 184 valid questionnaires, DC, the relationship between improvisation capability and competitive advantages, and the mechanism of the relationship between environmental dynamics were explored.

Jian, Wang, and Chen (2015) use 193 high-tech companies from Guangzhou, Beijing, and Xiamen as the research objects and the hierarchical regression results reveal that market orientation has a significant positive impact on technological innovation, and DC plays a full regulatory role in it. The entrepreneurial orientation has a significant positive impact on technological innovation, and DC plays a partial regulatory role in between. At the same time, the higher the environmental uncertainty faced by the organization, the greater the impact of DC on technological innovation.

Yuan, Jiang, and Chen (2016) analyze what kind of innovation type is chosen by a given strategy-oriented enterprise is related to its growth and improvement of the innovation performance. Based on the survey data of 434 Chinese companies, the relationship between DC and innovation types is analyzed, and then the role of strategic orientation in regulating the relationship between DC and innovation types is discussed.

Fu et al. (2016) analyze the impact mechanism of the uncertain environment on Chinese new enterprises' innovation performance based on the RBV and the DCT and through an introduction of the DC from a multi-level perspective. The research shows both dynamic management capabilities and enterprise DC have a significant positive impact on innovation performance; environmental uncertainty negatively regulates the relationship between dynamic management capabilities and innovation performance, it positively adjusted the relationship between enterprise DC, network DC and innovation performance.

Chen et al. (2017) analyze the development of medical service capacity and the cultivation of competitive advantages in the dynamic environment of county-level public general hospitals, and discussed the strategy formulation and route implementation from the perspective of DCT and through a combination of theoretical research, literature research and empirical research (Figure 2-1).

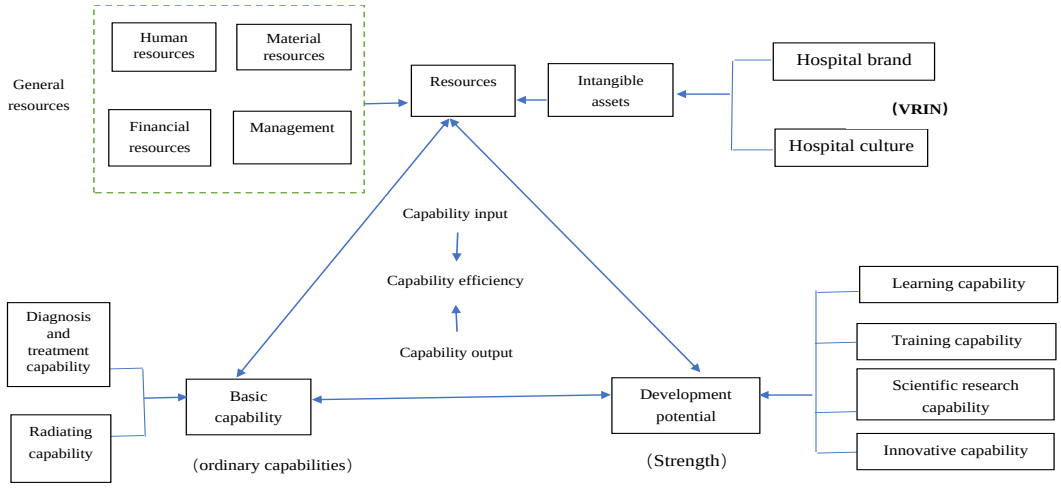

Figure 2-1 The Dynamic capability model of large public hospitals

Source: Chen (2017)

Xiao and Wang (2018) conduct an in-depth analysis of the enterprise's competitive advantages in the initial stage, growth stage and maturity stage and proposes a "stage rolling" model by taking the single-case longitudinal research method based on the theory of DC and competitive advantages.

Zhang et al. (2018) select a case study in order to analyze the evolution process of the business mode, and discussed how to realize the innovation of the business model through strategic choice and DC construction.

The above examples of empirical research progress of Chinese scholars on dynamic capability are show in Table 2-5.

Table 2-5 Examples of empirical research progress of Chinese scholars on dynamic capability

Author (s)	Theoretical viewpoints	Research conclusions
Dong, Ge, and Wang (2011)	RBV and DCT	DC play a full intermediary role in the relationship between the external resource acquisition process and competitive advantages of the enterprise, and it plays a partial intermediary role in the relationship between the resource allocation process and the competitive advantages of the enterprise.
Liu (2011)	DCT	Entrepreneurial learning and DC have a significant effect on the performance of new start-ups. Their effectiveness and explanatory power are higher than those of mature enterprises. Environmental dynamics has a regulating effect on this relationship.
Wu and Hu (2012)	Knowledge Management, DCT	The empirical results show that the knowledge management-enabled performance model is very consistent with hospital knowledge assets and capabilities, hospital process capabilities, and hospital performance, and in terms of

Author (s)	Theoretical viewpoints	Research conclusions
		providing high-quality care, hospital professionals are closely related to the performance mediated by knowledge management.
Jiao (2011); Fu, Han, and Li (2016)	DCT	Through utilization innovation to improve short-term financial performance and long-term competitive advantages based on the DC in the field of organizational and strategic management.
Jin and Chen (2015)	DCT	They verified how their balance can affect enterprises' innovation performance, and how can DC play an intermediary and regulatory role in the relationship between knowledge sources and exploratory innovation performance.
Tang, Liu and Xiao (2015)	RBV and network theories of strategy	They propose a strategic transformation process mechanism model from the perspective of DC, and describes the relationship and role route of each dimension of the model.
Ma, Song and Ge (2015)	DCT	They explore the relationship between improvisation capability and competitive advantages, and the mechanism of the relationship between improvisation capability and environmental dynamics.
Jian, Wang and Chen (2015)	DCT	The entrepreneurial orientation and DC play a full regulatory role in technological innovation. DC play a partial regulatory role in between. The higher the environmental uncertainty faced by the organization, the greater the impact of DC on technological innovation.
Yuan, Jiang and Chen (2016)	DCT	They analyze the relationship between DC and innovation types, and then the role of strategic orientation in regulating the relationship between DC and innovation types.
Chen et.al. (2017)	DCT	They analyze the development of medical service capacity and the cultivation of competitive advantages in the dynamic environment of county-level public general hospitals, and discusses the strategy formulation and route implementation.
Xiao and Wang (2018)	DCT and competitive advantages	They conduct an in-depth analysis of the enterprise's competitive advantages in the initial stage, growth stage and maturity stage and proposed a "stage rolling" model.
Zhang et al. (2018)	DCT	They discuss how to realize the innovation of the business model through strategic choice and DC construction.

2.8 Challenges for future research on DC

(1) It needs to be fully studied if the concept of DC needs to be useful for strategic management as a field of study and for practitioners. Research needs to reflect the phenomena it is studying by investigating the creation and evolution over time, which requires more longitudinal studies.

(2) Research needs to provide more focused studies of DC about how they are related to functional capabilities, such as IT, R&D and marketing, as well as focusing on more traditional industries, or in other countries with different constraints and conditions.

(3) There is a need to establish on how DC include the utilization of resources and the implementation of the new processes.

(4) There remain the conceptual problems, such as the distinction between operational and higher order capabilities. How does DC differ from resources, processes and capabilities?

(5) What are the relationships between DC and other organizational variables, especially firm strategy and firm performance? Research focusing on specific aspects of DC, such as opportunity identification, entrepreneurship, or flexibility will illuminate various aspects of business model innovation and implementation. These relationships and their impact on performance, will need to be sorted out (Teece, 2018).

(6) There is no mature theory of the relationship between DC, business model, strategy, and organizational design.

(7) A theory needs to clarify its particular boundary and category of boundary conditions relates to types of firms. Most researchers in the field of DC have not paid attention to bounding hypothesis, and few types of research explicitly investigated which types of firms are more likely to benefit from DC (Barreto, 2009).

(8) The DC approach needs to identify its most relevant contingency assumptions, because only a few researches incorporate contingency effects into their analysis.

2.9 Hypothesized theoretical model

To date, the full scope of DC in hospital ecosystems has not been fully understood. There are not explicit DC in infectious disease hospitals applied to an in-depth practical case. Based on the above reviews, we design the hypothesized theoretic model (Figure 2-2).

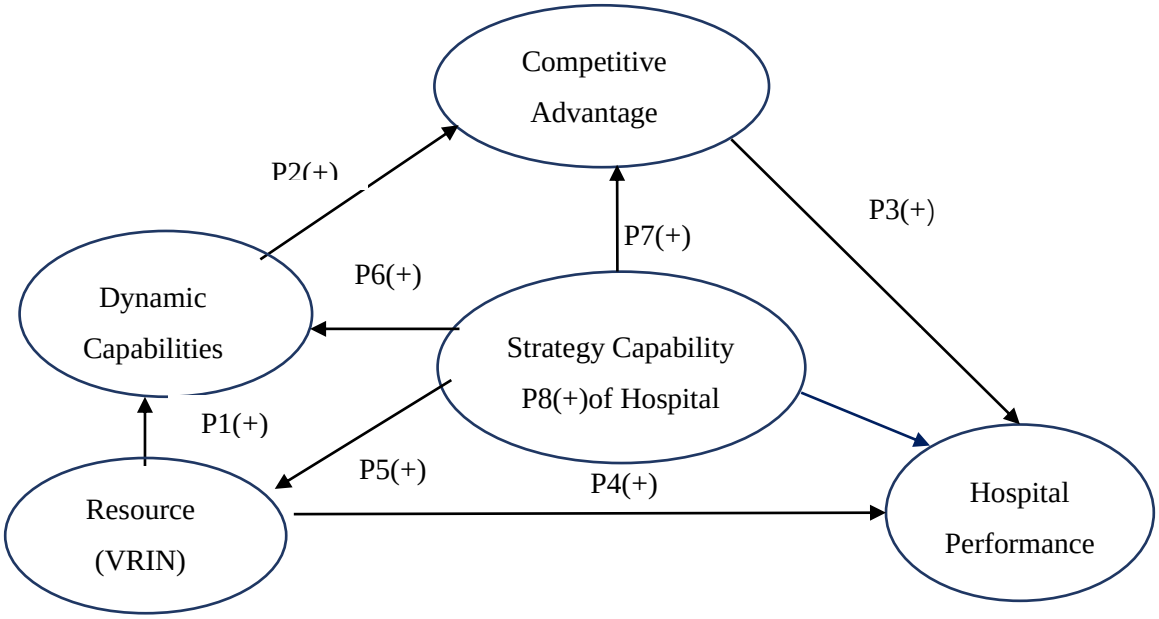

Figure 2-2 Hypothesized theoretical model

Proposition 1: Hospital resources are positively correlated to DC.

Proposition 2: Hospital DC are positively correlated to competitive advantages.

Proposition 3: Hospital competitive advantages are positively correlated to hospital performance.

Proposition 4: Hospital resources are positively correlated to hospital performance.

Proposition 5: Hospital strategic capabilities are positively correlated to hospital resources.

Proposition 6: Hospital strategic capabilities are positively correlated to DC.

Proposition 7: Hospital DC are positively correlated to competitive advantages.

Proposition 8: Hospital strategic capabilities are positively correlated to hospital performance.

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Chapter 3: Methodology

This chapter mainly introduces the main research methods, analysis approaches and the research protocol concerning the development strategy of hospitals for infectious diseases based on the DCT and SAs.

The research methods commonly used in management can be divided into quantitative research and qualitative research. Quantitative research methods include spot field investigation, experimental research, analytical research and theoretical research. The commonly used “mathematical modeling method” is one of the theoretical research approaches. Qualitative research methods include observation, interview, Delphi Method, focus group discussion and case study (Guo, 2011).

Researchers in strategic management leadership mainly adopted methods such as case studies, survey questionnaires, and simulations to measure DC (Bao & Long, 2015). The case study method is a qualitative study. The strength of qualitative studies can provide detailed descriptions of what processes are involved, the role of management, the reconfiguration of DC, and the interaction with the environment. The case study method applies to long-term process-oriented studies because of the integration configuration and updating of resources is often a long-term process, and case studies allow researchers to gain insight into and keep track of the process, thus making abstract concepts more visible.

Although the concept of DC is relatively abstract, some researchers have divided it into several dimensions based on definitions, developed their own scales, and adopted questionnaires to study DC in recent years. Large samples and easily quantifiable data increase the universality of the research conclusions of DC.

In addition to mainstream methods of case studies and questionnaires, a few researchers also used simulation methods to measure DC. The strategy is concerned with the relationship between the organization and its environment, as change is impossible to avoid and ubiquitous in a dynamic environment. Firms need to use strategic practices that can adapt to environmental changes and maintain competitive advantage. Strategic tools, such as SWOT analysis, PESTEL analysis, scenario analysis and balanced scorecard are often used (Hui, António, & Rosa, 2012).

This research mainly adopts the case study method in qualitative research.

3.1 Introduction to case study

Case study is one of the methods used in social science research. It is a type of empirical study, that is, it studies the ongoing phenomenon without breaking away from the real-life environment, and the boundary between the phenomenon to be studied and its environmental background is not very obvious (Yin, 2015). From a technical perspective, case study deals with the particular situation where the variables to be studied outnumber the data points. Hence it is necessary to collect data through various channels and integrate all the data together for cross analysis. Therefore, theoretical hypotheses should be put forward in advance to guide data collection and data analysis. Case study includes single-case study and multiple-case study. Multiple-case study follows the replication logic, which means that more experiments will be done after important results are obtained in a certain experiment, so as to verify whether the same experimental results can be obtained in the following experiments, thereby judging the value of research. If there are conflicting results in a few cases, the theoretical propositions proposed in advance should be modified. The design of case study consists of 5 elements: research questions, theoretical propositions, analytical units, the logic associating data and hypotheses, and the criteria for interpreting research results. Theoretical propositions are an important tool for inductive analysis of case study.

The indicators for evaluating the quality of case study design are constructing validity, internal validity, external validity and reliability.

3.1.1 Process of case study (Figure 3-1)

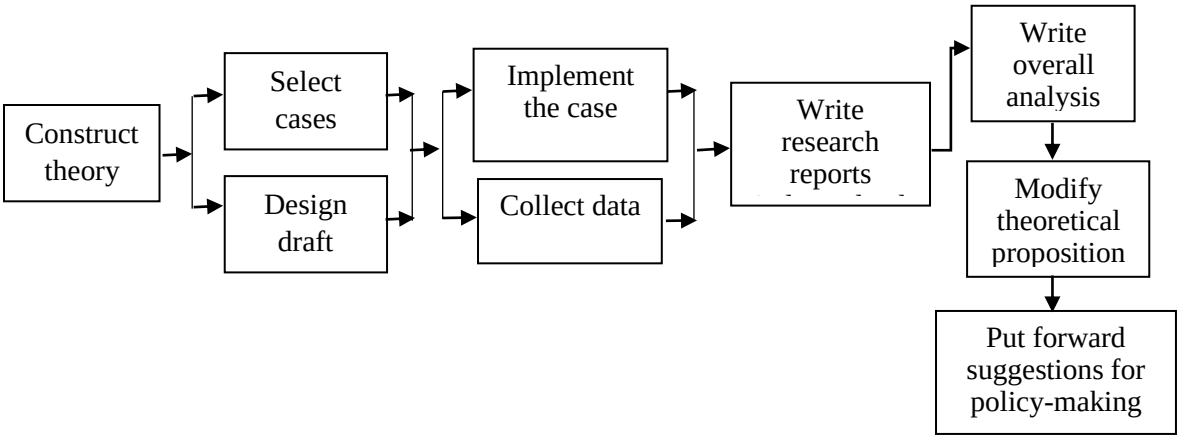

Figure 3-1 Process of case study

3.1.2 Case study preparation

The preparatory stage of case study includes: case study training, formulate draft case study plan, screen cases and conduct trial test. Researchers conducting case study should have the following basic skills: putting forward good questions; being a good listener; flexibility in training adaptability; being aware of the essence of the research questions; and being unprejudiced. The process of case study must comply with ethic rules in order to protect the privacy and secrets of the research subjects. The study protocol includes work content, work procedures and the principles of implementing the protocol. The draft case study plan can help to increase the reliability of case study.

3.1.3 Purposes of case study

The purposes of case study are: (1) to verify whether the DC theory is applicable to the development strategy of hospitals for infectious disease; (2) to summarize the experience and lessons of the infectious disease hospitals in the development process, and the pros and cons of the implementation of the strategic alliance; (3) to analyze how to renew their own resources and capability mix, and maintain their competitive advantages in the development process of infectious disease hospitals, so as to cope with the rapidly changing environment.

3.1.4 Data collection process

Case selection. The cases of this study are mainly selected from the 35 members of the infectious disease hospitals, 25 members of them from the Yangtze River Delta Infectious Disease Prevention and Treatment Alliance, which is led by the Shanghai Public Health Clinical Center and jointly established by the infectious disease hospitals in the Yangtze River Delta region, was officially established in August 2019. Its establishment is conducive to the innovation of regional public health incident response mechanism, as well as the establishment of the hierarchical diagnosis & treatment and management mechanism of infectious diseases in the Yangtze River Delta. It also provides experiences for the treatment and management of public health events in China. As the COVID-19 spreads globally, the Chinese government attaches great importance to the construction of public health system, especially to strengthen the disease control system and the supply of hardware facilities for infectious diseases hospitals. Infectious diseases hospitals have ushered in a new round of development, in which some of them will face transformation. The cases in this study are representative hospitals with their own characteristics selected from the 35 members of the Medical Treatment Alliance. At the same time, since the original plan to study in other provinces and cities cannot be realized due to the pandemic, considering the accessibility and convenience of quantitative data selection, this study has selected 10 infectious diseases hospitals as the cases. Finally, according to the comprehensiveness of data analysis, 8 infectious diseases hospitals are selected as the key cases of the research, namely Shanghai Public Health Clinical Center (SPHCC), Chongqing Public Health Medical Center (CPHMC), Wuxi Fifth People's Hospital (WFPH), Yancheng Second People's Hospital (YSPH), Shanghai Fengxian District Guhua Hospital (SFDGH), Zunyi Fourth People's Hospital (ZFPH) , Harbin Sixth People's Hospital (HSPH) and Shanghai Pudong New Area Infectious Diseases Hospital (SPNAIDH). SPHCC is selected as experimental case. Among the 8 infectious diseases hospitals, 3 of them are in Shanghai, 2 in Jiangsu province, 1 in Chongqing, 1 in Guizhou Province, and 1 in Heilongjiang province; additionally, 6 of them are tertiary hospitals and 2 secondary hospitals. The Yangtze River Delta is a relatively developed region in China, and the integrated development of Yangtze River Delta has become a national strategy. The reason of choosing Chongqing Public Health Medical Center, Zunyi Second People's Hospital and Harbin Infectious Diseases Hospital as the cases is that, while fighting the COVID-19 pandemic, with the municipal governments' approval for expansion, the three

hospitals have got further developed in terms of both scale and function. Moreover, Chongqing is a super large city with a population of about 30 million in southwest China, Harbin is the capital city of Heilongjiang province in northern China, Zunyi is the important city of Guizhou province, so these 3 cities are of certain significance in this study. The List of interviewees is as shown in Table 3-1.

Data sources. This case study adopts first-hand data collected in a variety of ways including interviews, internal documents, literature, press releases, websites and lectures. The participants are 35 leaders from 8 infectious diseases hospitals in China. Among all the participants, 26 leaders were interviewed on-site, and the other 9 were interviewed by telephone and WeChat because of the restrictions for preventing the COVID-19. The data were collected by 5 researchers in 4 months from February 2020 to May 2020.

Table 3-1 List of interviewees

Hospital	Hospital Grade	Interviewee Name Code	Position	Position Level	Gender	Years of Management	Date of Interview	Interview Time (minutes)	Interview Words
Shanghai Public Health Clinical Center	Three-A	ZTY	President	High	Male	> 10 years	April 18, 2020	40	3483
Shanghai Public Health Clinical Center	Three-A	ZZL	Vice President	High	Male	> 10 years	April 24, 2020	30	2921
Shanghai Public Health Clinical Center	Three-A	CL	Vice President	High	Male	> 10 years	February 21, 2020	30	2253
Shanghai Public Health Clinical Center	Three-A	SYX	Vice President	High	Male	> 10 years	February 19, 2020	40	3485
Shanghai Public Health Clinical Center	Three-A	CZJ	Chief Accountant	High	Female	> 10 years	February 19, 2020	40	3465
Shanghai Public Health Clinical Center	Three-A	ZHL	Deputy Party Secretary	High	Female	> 10 years	February 20, 2020	90	8175
Shanghai Public Health Clinical Center	Three-A	SYZ	Director of medical department	Middle	Male	> 10 years	February 18,2020	30	2913
Shanghai Public Health Clinical Center	Three-A	YZS	Director of thoracic surgery	Middle	Male	> 10 years	March 26, 2020	20	927
Chongqing Public Health Treatment Center	Three-B	CXB	Secretary of the Party Committee	High	Male	> 10 years	April 9, 2020	30	2132
Chongqing Public Health Treatment Center	Three-B	YZP	Vice President	High	Male	> 10 years	April 21, 2020	20	1376
Chongqing Public Health Treatment Center	Three-B	YXF	Vice President	High	Female	> 10 years	April 29, 2020	30	2672
Chongqing Public Health Treatment Center	Three-B	CYK	Member of the Party committee	High	Male	3-5years	April 21, 2020	30	2708
Wuxi Fifth People's Hospital	Three-B	LXJ	President	High	Male	> 10 years	March 23, 2020	30	2449

Hospital	Hospital Grade	Interviewee Name Code	Position	Position Level	Gender	Years of Management	Date of Interview	Interview Time (minutes)	Interview Words
Wuxi Fifth People's Hospital	Three-B	QYW	Vice President	High	Male	< 3 years	April 30, 2020	50	5136
Wuxi Fifth People's Hospital	Three-B	STX	Vice President	High	Female	> 10 years	April 24, 2020	30	1538
Wuxi Fifth People's Hospital	Three-B	ZRF	Director of hospital office	Middle	Male	> 10 years	April 21, 2020	20	1289
Yancheng Second People's Hospital	Three-B	WZ	President	High	Male	> 10 years	April 13, 2020	25	2300
Yancheng Second People's Hospital	Three-B	YW	Vice President	High	Male	> 10 years	April 13, 2020	20	1858
Yancheng Second People's Hospital	Three-B	TF	Director of Medical Education Department	Middle	Male	5-10years	April 21, 2020	50	5933
Yancheng Second People's Hospital	Three-B	LH	Vice President	High	Male	> 10 years	April 22, 2020	35	3738
Harbin Six People's Hospital	Three-B	WJW	Vice President	High	Male	> 10 years	April 14, 2020	40	4658
Harbin Six People's Hospital	Three-B	CL	Assistant President	High	Female	5-10years	April 14, 2020	30	3193
Shanghai Pudong District infectious diseases hospital	Two-A	ZH	President	High	Male	> 10 years	April 10, 2020	30	1268
Shanghai Pudong District infectious diseases hospital	Two-A	FYF	Secretary of the Party Committee	High	Female	> 10 years	April 10, 2020	30	2970
Shanghai Pudong District infectious diseases hospital	Two-A	HXF	Vice President	High	Female	5-10 years	April 10, 2020	30	2137
Shanghai Pudong District infectious diseases hospital	Two-A	ZMF	Director of hospital office	Middle	Female	> 10 years	April 10, 2020	30	2124
Shanghai Fengxian Guhua hospital	Two-A	SWX	President	High	Male	> 10 years	April 29, 2020	40	3885

Hospital	Hospital Grade	Interviewee Name Code	Position	Position Level	Gender	Years of Management	Date of Interview	Interview Time (minutes)	Interview Words
Shanghai Fengxian Guhua hospital	Two-A	WJ	Vice President	High	Female	5-10 years	April 29, 2020	90	10487
Shanghai Fengxian Guhua hospital	Two-A	SGH	Vice President	High	Male	> 10 years	April 29, 2020	60	6176
Shanghai Fengxian Guhua hospital	Two-A	KYM	Member of the Party committee	Middle	Male	> 10 years	April 29, 2020	30	2384
Shanghai Fengxian Guhua hospital	Two-A	ZLQ	Director of hospital office	Middle	Female	3-5 years	April 29, 2020	30	2612
Zhunyi Fourth People's Hospital	Three-B	YXC	Vice President	High	Female	> 10 years	May 26，2020	30	4472
Zhunyi Fourth People's Hospital	Three-B	WP	Vice President	High	Male	> 10 years	May 26，2020	45	5645
Zhunyi Fourth People's Hospital	Three-B	WCF	Member of the Party committee	Middle	Female	> 10 years	May 26，2020	15	970
Zhunyi Fourth People's Hospital	Three-B	WQZ	Vice President	High	Male	> 10 years	May 28，2020	60	4755

The implementation and ethics of interview. This interview is a semi-structured interview. Before the interview, prepare the interview outline, send the outline to the interviewee in advance, and interview according to the outline, but not limited to the problem of the outline, and conduct the interview flexibly according to the scene. In the interview, first explain the purpose of the interview to the interviewee, hope to get the support of the interviewee, and try not to interrupt the speech of the interviewee in the narration. During the interview, the questions on the outline of the interview is put forward timely around the topic of the interview. Before the start of the interview, explain to the interviewees that the interview needs to be recorded, and then record it with consent. At the end of the interview, according to the requirement of 24 "hours rule", the interview records were converted into words in 24 hours, and a total of more than 112,000 words of interview materials were accumulated. Then, the interview materials are read and summarized repeatedly after combing, analyzed and explained systematically according to the DC framework.

Interview reliability: both the researcher and the interviewee are from the infectious disease hospitals, and the hospitals included in the case are mainly from the hospital where the researcher of the subject works for study and investigation. They know each other and know the background, which ensures the reliability of the interview data.

Interview validity: validity includes surface validity, predictive validity, structural validity and content validity. In the interview, the researcher asks questions around the outline, adds questions appropriately, sets interactive questions to guide the interviewee to narrate fully, so that the interview can be full, and ensures the surface validity and content validity.

Interview ethic: the ethical principle of this study is to participate in the interview voluntarily after asking for opinions in advance, and each interviewee will accept the interview voluntarily. After the interview, the expert consultation fee will be paid through the project fund supported by the government. During the interview, the voice recording opinions shall be consulted in advance, and the implementation shall be started after approval. Each interviewee knows the purpose of the interview materials and codes the name of the interviewee.

3.2 Data analysis

3.2.1 Case analysis tools

NVivo, XSight, MAXqda, and Atlas.ti are relatively perfect and representative tools for qualitative analysis (Hu, 2012). In this study, the computer aided tool NVivo 12 Plus is used to analyze qualitative data. NVivo 12 software is a powerful analysis software for qualitative data developed by QSR International Corporation. It can effectively analyze different types of data including document, PDF, video, photo and audio, then quantify the data and carry out quick and in-depth qualitative analysis. With the help of such functions as importing data, creating nodes, coding, highlighting key points, retrieval, model mapping, formulating charts and running reports, researchers can quickly recall the interviews, thus organize and process complex information, and extract valuable information from the data (Luo et al., 2011). One of the biggest advantages of qualitative research is its efficiency and powerful coding function. This study adopts the popular NVivo 12 Plus version with powerful coding function. NVivo 12 Plus mainly uses such functions as data coding as well as analysis and statistics to encode the interview data and analyze the relationship between the data repeatedly, thereby verifying the theoretical hypotheses. Compared with Atlas.ti and MAXqda, NVivo shows strength in its user-friendly interface, which is designed with Microsoft style featuring strong visualization, handy operation and multiple languages available. It can use “tree nodes” to establish a downward coding relationship, offer strong search function, set up case analysis of multiple documents and multimedia data, build relations between nodes, adopt models to generate visual charts and Excel reports, as well as write notes and memorandums. With the help of qualitative analysis tools, scientific qualitative data analysis is carried out to improve the efficiency and quality of qualitative research.

3.2.2 Data analysis process

Data analysis is a key step in theory construction. The analysis process is difficult since researchers need to analyze massive data to explore the uniqueness of each case. Intra-case analysis is carried out first, then cross-case analysis follows, in which a large amount of words is needed to describe the data analysis process in detail. The cross-case analysis follows the replication logic, that is, after finding similar topics, a preliminary theoretical idea is formed, and then the data are simplified through the replication logic. By

comparing the data repeatedly, specific topics in each case are verified systematically. The key to cross-case analysis is to analyze data through a variety of approaches. Generally, there are 3 ways: (1) Decide the categories and dimensions first, and then find out similarities and differences within each group and between groups. Dimensions can be based on the research questions or reference from existing literature. (2) Match cases, in which similarities and differences between the two cases in each pair need to be listed, and then help researchers find similarities and differences between cases, as well as explore the common ground among seemingly different cases so as to help researchers break the fixed mindset. (3) Categorize and analyze data according to the source. Researchers are divided into several groups, namely collation observation data group, interview data group and questionnaire survey data group. The advantage of this method is that when the model based on some source of data are confirmed by the data collected from other sources, the result is more reliable. If the evidences conflict, the contradiction between evidences can be resolved through further analysis of the reasons behind the conflict. Cross-case analysis requires researchers to analyze data in a diversified and structured perspective, so as to improve the possibility of finding accurate and reliable theories. In this study, 3 researchers participated in interviews and data analysis.

3.3 The formulation of propositions and theories

Through repeated intra-case and cross-case comparisons, systematic comparison between the theoretical framework and evidences from various cases, as well as assessment of the degree of fit between the framework and case data, the theory highly consistent with the data will be preferred after repeated comparisons. The above process makes full use of possible new discoveries in data to formulate a theory with empirical validity. The formulation of propositions consists of two steps: (1) Extract the constructs. This process includes two parts, namely improving the definition of constructs, and establishing evidence and verifying the constructs in each case. Establishing the validity of constructs is very important. Researchers need to carefully formulate the definition and evidence of the constructs, and finally produce precisely defined and measurable constructs, which is a must to form a strong theory. (2) Verify whether the relationship between constructs is consistent with the evidences in the cases. Each hypothesis is required to be verified by each and every case, not by all the cases combined. Therefore, replication logic is needed to treat a series of cases as a series of experiments. In replication logic, the

relationship between variables can be verified repeatedly through cases to enhance the credibility of validity. Cases that do not support these relationships provide opportunities for improvement and expansion of the theory. It is very important to discover in-depth theories of relationship, which helps to establish the internal validity of theoretical discovery. Generally speaking, in the research of theory construction, the formulation of propositions usually includes the measurement of constructs and the verification of relationship. The research process of theory construction is more subjective, and it is to judge the consistency of the relationships concluded in the intra-case analysis and cross-case analysis. The advantage of case study in theory construction is to increase the possibility of generating new theories. The theory it produces can be more likely to be verifiable, and the constructs can be directly measured; additionally, the theory obtained may have empirical validity.

3.4 Literature comparison

A characteristic of theory construction is to compare the obtained concepts, theories or propositions with the existing literature so as to analyze the similarities and contradictions and the reasons behind. The reason for the comparison with existing literature is that, if the credibility of the research results is increased, conflicts with existing literature will encourage researchers to adopt more innovative and breakthrough methods, and also help to accurately define the application scope of the existing research conclusions. It is equally important to discuss and study similar literature, which can link seemingly unrelated phenomena through internal similarity, and draw a conclusion with stronger internal validity, greater universality and higher theoretical level.

3.5 The criteria for ending case study

Whether or not to end the case study depends on two factors: (1) When to stop adding cases. Generally, when the theory reaches saturation, researchers can stop adding new cases, that is, at a certain point, the amount of newly acquired knowledge becomes very small and the phenomenon that the researchers observe have already been seen before. In this context, generally 4-10 cases should be adopted. (2) When to stop the repeated comparison between theory and data. Saturation is also one of the core criteria. When the possibility of further improvement reaches its minimum, the comparison can be stopped.

The final result of case study may be concept, conceptual framework, proposition, or just the simple replication of existing theory (Eisenhardt, 2017).

Chapter 4: Field Study

This chapter mainly elaborates on how specialized hospitals for infectious diseases combine their own resources with capability to maintain their competitive advantages in order to cope with the rapidly changing environment during the process of development. Although dilemma and developing strategies are commonly seen difficulties for leaders in specialized hospitals for infectious disease, there are few researches about how they are studied with management theory. How do DC affect the rapidly changing strategic decisions of senior managers? By comparing the 8 specialized hospitals for infectious diseases, this research concludes the strategic management direction combining the advantageous resources, DC, core competitiveness and hospital performance.

4.1 A brief introduction to representative hospitals

4.1.1 Shanghai Public Health Clinical Center

About the hospital. SPHCC, short for Shanghai Public Health Clinical Center, is a Three-A (first level) hospital founded in 1914, with a history of over 100 years. In 2004, it was relocated to Jinshan District with a coverage area of 115,304.51 square meters. Its division is located in Hongkou District with a building area of 26,026 square meters. The total coverage area of the hospital ranks the first in Shanghai. So far, SPHCC has 40 clinical departments and 660 authorized beds. It is the WHO Clinical Research and Training Center for Emerging and Re-emerging Infectious Diseases and maintains extensive cooperation with major public health research institutions in the world.

The scale and level of hospital staff. SPHCC now has 1253 staff, including 253 doctors, 500 nurses and 138 scientific researchers. Its technological influence ranked the third in the field of infectious diseases in China in 2016.

Key departments. The department of gynecology and obstetrics and the department of infectious diseases are selected as key disciplines by the Ministry of Education because of their affiliation to Fudan University. SPHCC also becomes a national project unit for key clinical specialty development, and one of the key discipline building units for infectious diseases in Shanghai.

4.2.2 Chongqing Public Health Medical Center

About the hospital. CPHMC, short for Chongqing Public Health Medical Center, is the only Three-B specialized hospital of infectious diseases, an authoritative institution of infectious diseases diagnosis and treatment, and the public health hospital affiliated to Southwest University in Chongqing. CPHMC was originated from the Chongqing Chest Hospital built in 1943 and the Chongqing Infectious Diseases Hospital established in 1945. These two hospitals were amalgamated into Chongqing Public Health Medical Center in 2008, with a total coverage area of over 93,333 square meters. It has two hospital districts including Geleshan hospital branch and Pingdingshan hospital branch with 800 authorized beds in total. Geleshan hospital branch is responsible for the medical treatment and emergency response to public health infectious diseases. It is the key research office and Clinical Base of Traditional Chinese Medicine (TCM) for Infectious Diseases' Prevention and Treatment of the State Administration of TCM.

The scale and level of hospital staff. CPHMC now has 946 employees, including 118 with associate senior titles and above, 97 with master degree and above, and 10 with doctor's degree.

Key departments. It is a key discipline building unit for Infectious Diseases and Infectious Diseases of TCM in Chongqing. The Department of Infectious Diseases and the Department of Respiratory Diseases (tuberculosis) were approved to be projects for key clinical specialties in Chongqing. It is powerful in the diagnosis and treatment of tuberculosis and Acquired Immune Deficiency Syndrome (AIDS).

4.1.3 Wuxi Fifth People's Hospital

About the hospital. WFPH, short for Wuxi Fifth People's Hospital, was originated from the Wuxi Infectious Diseases Hospital built in 1951. It is a Three-B specialized hospital in treating all kinds of infectious diseases, the first one in Southern Jiangsu and the only one in Wuxi. It opens 600 beds for patients. It is the clinical base of TCM infectious diseases of the State Administration of TCM and the model unit of national general (specialized) hospital. In 2016, WFPH and Second People's Hospital jointly established Wuxi Puren Medical Group, adopting the group management mode under the leadership of council.

The scale and level of hospital staff. The hospital now has 745 staff, including 29 associate chief physicians, 31 chief physicians, 16 associate chief nurses and 1 chief nurse.

Key departments. The hospital now has 2 provincial and 2 municipal key specialties. There are comprehensive departments including infectious department, hepatitis department, oncology department, tuberculosis department, respiratory department and so on. The new hospital district has three medical centers including Wuxi Neurological Disease Medical Center, Wuxi Infectious Disease Medical Center and Wuxi Puren Tumor Diagnosis and Treatment Center, and the largest hemodialysis center in Wuxi. The Wuxi Liver Disease Research Institute is the only scientific research institution for liver diseases in Wuxi.

4.1.4 Yancheng Second People's Hospital

About the hospital. YSPH, short for Yancheng Second People's Hospital, was originated from Yancheng Tuberculosis Prevention and Control Hospital built in 1954, and changed its name to Yancheng Region Infectious Disease Hospital in 1981, to Yancheng Second People's Hospital in 1983. It was also named Yancheng Tumor Hospital in 1995. It is a tertiary hospital with specialties of tumor, liver disease, lung disease and so on. The hospital covers an area of 40 mu with a total construction area of 32,900 square meters. It opens 550 bed for patients. The hospital adheres to the development mode of "One Body and Two Wings" with overall development as one body and the disciplines of oncology and infectious diseases as two wings.

The scale and level of hospital staff. The hospital has 468 employees, including 89 with senior titles, 125 with intermediate titles. Many experts in the hospital act as the president and vice president of provincial and municipal medical association.

Key departments. There are 1 to 2 provincial key clinical specialties. There are 12 wards, 17 clinical departments and 5 medical technical departments. Oncology radiotherapy department, oncology chemotherapy department, hepatopathy treatment department and tuberculosis department are municipal key clinical specialties.

4.1.5 Shanghai Pudong New Area Infectious Diseases Hospital

About the hospital. SPNAIDH, short for Shanghai Pudong New Area Infectious Disease Hospital, formerly the Infectious Disease Department of Chuansha People's Hospital, was established on the basis of the Infectious Disease Department in 1988. It is

the only Two-A specialized infectious disease hospital in Pudong New Area that specializes in the treatment of various infectious diseases. It covers an area of 7,342 square meters. Now it has 100 beds, and the number can reach 150 during public health emergencies. At the end of 2002, it cooperated with Shuguang Hospital affiliated to Shanghai University of Traditional Chinese Medicine to establish Pudong Liver Disease Specialized Hospital of Shuguang Hospital. As the observational hospital for pneumonia of unknown cause in Pudong District New Area, the hospital is equipped with a ward of quarantine to deal with and manage Two-A infectious diseases. It is the designated hospital of Shanghai Port. It is listed as the base unit of integrated Traditional Chinese and Western medicine for infectious disease by the State Administration of TCM.

The scale and level of hospital staff. The hospital has 82 staff members, including 20 doctors of TCM, integrated Traditional Chinese and Western medicine at all levels, among whom 7 are chief and deputy chief physicians.

Key departments. The liver diseases specialty with integration of traditional Chinese and Western medicine is a key discipline in liver diseases treatment in Shanghai.

4.1.6 Shanghai Fengxian District Guhua Hospital

About the hospital. FDGH, short for Shanghai Fengxian District Guhua Hospital, was first established in 1968 as Fengxian County Leprosy Prevention and Control Clinic. It changed the name to Fengxian County Infectious Diseases Hospital in1984 and to Fengxian County Guhua Hospital in 1996. In 2000, Fengxian District Geriatric Hospital (the second name) was established. In 2011, Fengxian District Medical Examination Station was incorporated into Guhua Hospital. The hospital only focused on simple prevention and treatment of infectious diseases, but now it has developed into a secondary hospital that focuses on infectious diseases and liver diseases, features geriatric diseases and tumor rehabilitation, and integrates medical teaching. It covers an area of 7,814 square meters with a construction area of 11,000 square meters. It has 200 authorized beds and 275 open beds.

The scale and level of hospital staff. There are 181 employees, including 70 professional technicians and 16 with senior titles.

Key departments. Infectious diseases, liver diseases, geriatric diseases and pulmonary diseases are characteristic specialties of this hospital.

4.1.7 Harbin Sixth People's Hospital

About the hospital. HSPH, short for Harbin Sixth People's Hospital, is largest state-designated specialized hospital for various infectious diseases in Heilongjiang province. The hospital was built in 1946 and covers an area of 40,000 square meters with a construction area of 13,400 square meters. There are 500 beds in the hospital and It is the publicly recognized medical teaching and research center for infectious diseases in Heilongjiang Province.

The scale and level of hospital staff. It has 390 employees, including 330 professional technicians and 122 with senior titles.

Key departments. The municipal-level key discipline is the liver disease treatment in the Liver Disease Research Institute of Harbin. Blood purification center is a department with rapid development in recent years.

4.1.8 The Fourth People's Hospital of Zunyi City

About the hospital. ZFPH, short for the Fourth People's Hospital of Zunyi City, is a public hospital with full financial budget supported by Zunyi municipal government, the only infectious disease hospital and the municipal designated hospital for AIDS and tuberculosis in Zunyi City. It is also a hospital for Zunyi Airport's infectious disease surveillance and treatment and a national clinical base for the prevention and control of infectious diseases with TCM. In 2019, the new hospital was put into operation. The new hospital district covers an area of 243 mu with a construction area of 95,160 square meters. It has a total investment of 1.5 billion yuan and 800 authorized beds. In 2020, the construction project for hospital's standard infectious disease area was approved with a planned investment of 664 million yuan, a planned area of 60,000 square meters, a total construction area of 75,000 square meters, 500 fixed beds and 400 reserved beds.

The scale and level of hospital staff. The hospital has 784 employees in total, including 338 nurses and 285 doctors and medical technicians. There are 14 postgraduates, 2 chief physicians, 28 associate chief physicians, 42 attending physicians, 7 associate chief nurses, 12 chief nurses and 14 postgraduates among the hospital's staff.

Key departments. There are 28 clinical, medical technology and auxiliary departments in the hospital. It also sets up Zunyi AIDS clinical medical Center, Zunyi tuberculosis clinical medical center and Zunyi liver disease clinical medical center.

4.2 Analysis of interview data

The qualitative materials of this research are mainly the interview materials from middle and senior managers in infectious disease hospitals. In the research, we follow the following steps.

4.2.1 Coding

After the interview material is input into the framework, the data are first coded without the application of any theoretical framework. The contents and events of infectious hospitals related to the status quo, strategic adjustment, strategic alliance, core competitiveness, development status, dynamic capability, hospital culture and hospital performance are coded one by one (Figure 4-1). The specific step is to select the relevant statements, establish nodes and input description on the nodes. Nodes refer to what should be coded. In the same material, the same contents will be found, So the number of nodes (reference points) increases accordingly.

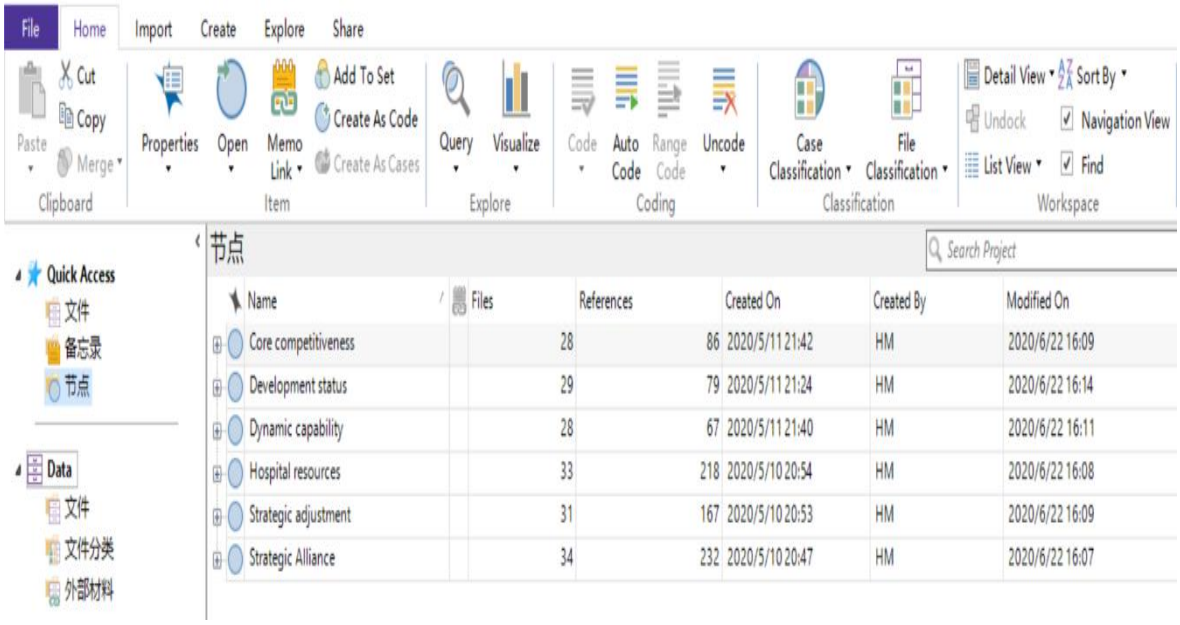

Figure 4-1 Computer screen shot of the material interview coding

During open coding, there are multiple interpretations (codes) of the same material. The final results depend on researchers' understanding of the material. In fact, the researcher has started the analysis of the materials during the coding. The process of coding is the process of verify theoretical framework, during which the researcher starts

with propositions and gradually intends to prove or rectify the propositions during the process of coding.

4.2.2 The classification and extraction of codes

After coding all the materials, the researcher uses QSR NVivo 12 software to classify and extract the codes. The author extracts axis codes and core codes respectively. These are based on computer data and researchers' analysis of interview materials (Table 4-1, Figure 4-2).

Table 4-1 Table of coding analysis on qualitative materials

2nd Order Coding	1st Order Coding	References
(1) Shrinking of infectious disease business (2) Talent shortage and recruitment difficulties (3) Insufficient government attention and input (4) Poor hardware conditions (5) Restricted name of infectious disease hospital (6) Subject development constraints (7) Single disease (8) Lack of integrated capability (9) Small hospital size (10) Infectious disease hospitals merged (11) Lack of centralized management of infectious disease patients (12) High operating costs (13) Insufficient profitability (14) Low employee income (15) Fierce competition in hospitals	Status of development	79
(1) Combined peacetime and wartime (2) Development Business (3) Maintain the traditional advantages of comprehensive development Talent strategy (4) Hospital transformation (5) Management of cadres (6) Medical quality (7) Internationalization strategy (8) Establishment of strategic alliances (9) Differentiated competition (10) Innovative development (11) Research driven	Strategic adjustment	167
(1) Relationship of alliance units (2) Construction of medical treatment alliance (3) Countermeasures of medical treatment alliance problems (4) Problems of medical treatment alliance (5) Advantages of medical treatment alliance	Strategic alliance	232

(6) Dominant disciplines (7) Geographical location (8) Resource scarcity (9) Employee satisfaction (10) Long history (11) Resource allocation (12) Talent advantage (13) Leadership unity (14) Refined management (15) Fiscal subsidies (16) Hospital size (17) Hospital brand (18) Policy support	Hospital resources	218
(1) Emergency response capacity (2) Resource mobilization capacity (3) Active Learning Ability (4) Decision-making capacity (5) Strategic thinking (6) Ability to turn a hazard into an engine (7) Process re-engineering (8) Information	Dynamic capability	67
(1) Scientific research capability (2) Subject matter (3) Talent	Core competitiveness	85

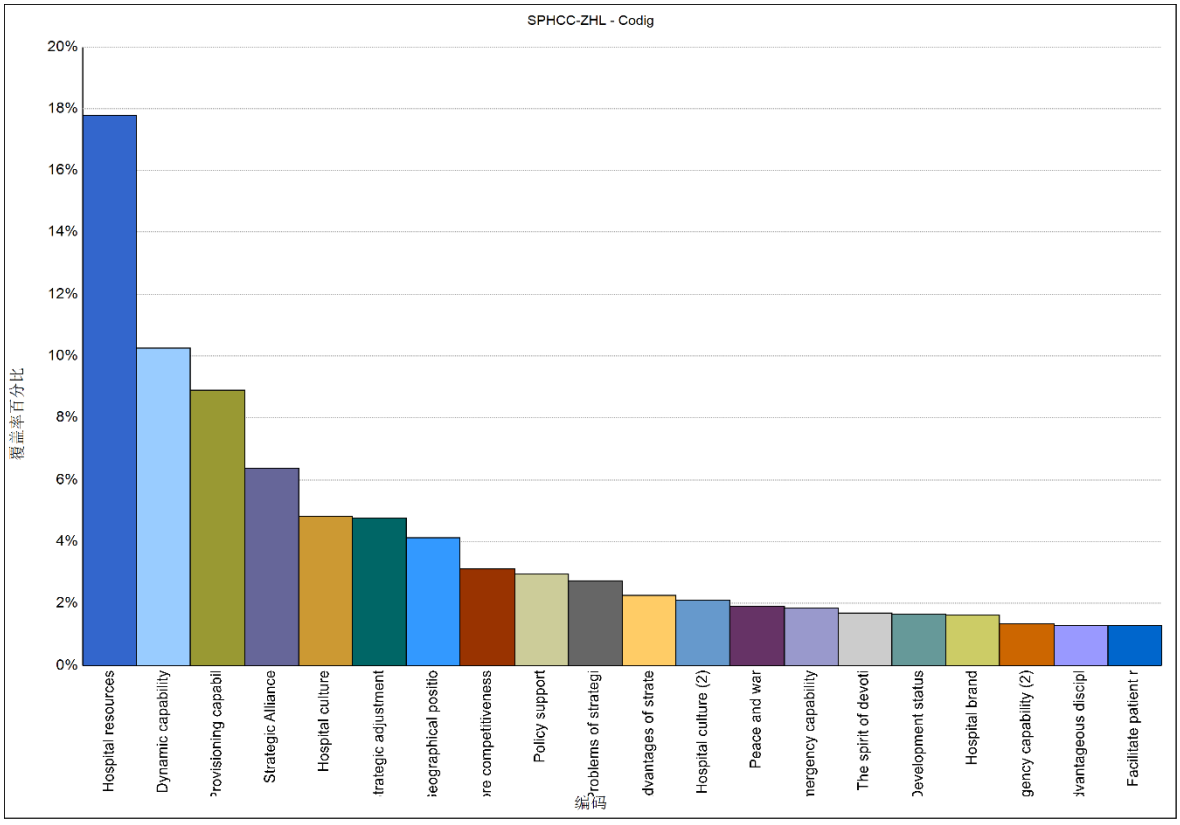

Figure 4-2 Node graph based on the qualitative materials of a certain interviewee

4.2.3 The establishment of a preliminary theory

In qualitative research, building a theory can provide deeper meaning to interview materials as qualitative research focuses more on the analysis and conclusion of materials. Preliminary theory established at early times of research can guide later research. The researcher forms valuable theories after materials analysis. In this research, the researcher adopts the bottom-up analytical method to build connections through core nodes and analyze the developmental strategies of hospitals for infectious diseases which constitute the case analysis below.

4. 3 Case analysis

4.3.1 Status quo of infectious disease hospitals

The literature published at early times show that hospitals for infectious diseases are greatly influenced by government policies, such as health care reform, distant location of hospitals, health insurance policy, drugs, zero plus health policy for medical consumables, low pricing, loose centralized management and insufficient financial compensation. Traditional hospitals for infectious diseases with late transformation mainly focus on internal medicine (infectious disease), with single discipline and limited talent resources, which leads to the vicious circle of severe talent outflow and difficulty in attracting talents.

According to statistics of hospitals' status quo nodes given by NVivo 12 software as shown in Figure 4-3 and Table 4-2, this research found that the major reasons for infectious diseases hospitals' difficult operation are insufficient attention and investment from government, scarce talent resources caused by difficult talent inflow severe talent outflow, and incapability of comprehensive clinical treatment. Compared to previous researches, this research focuses on the common difficulties of infectious diseases hospitals.

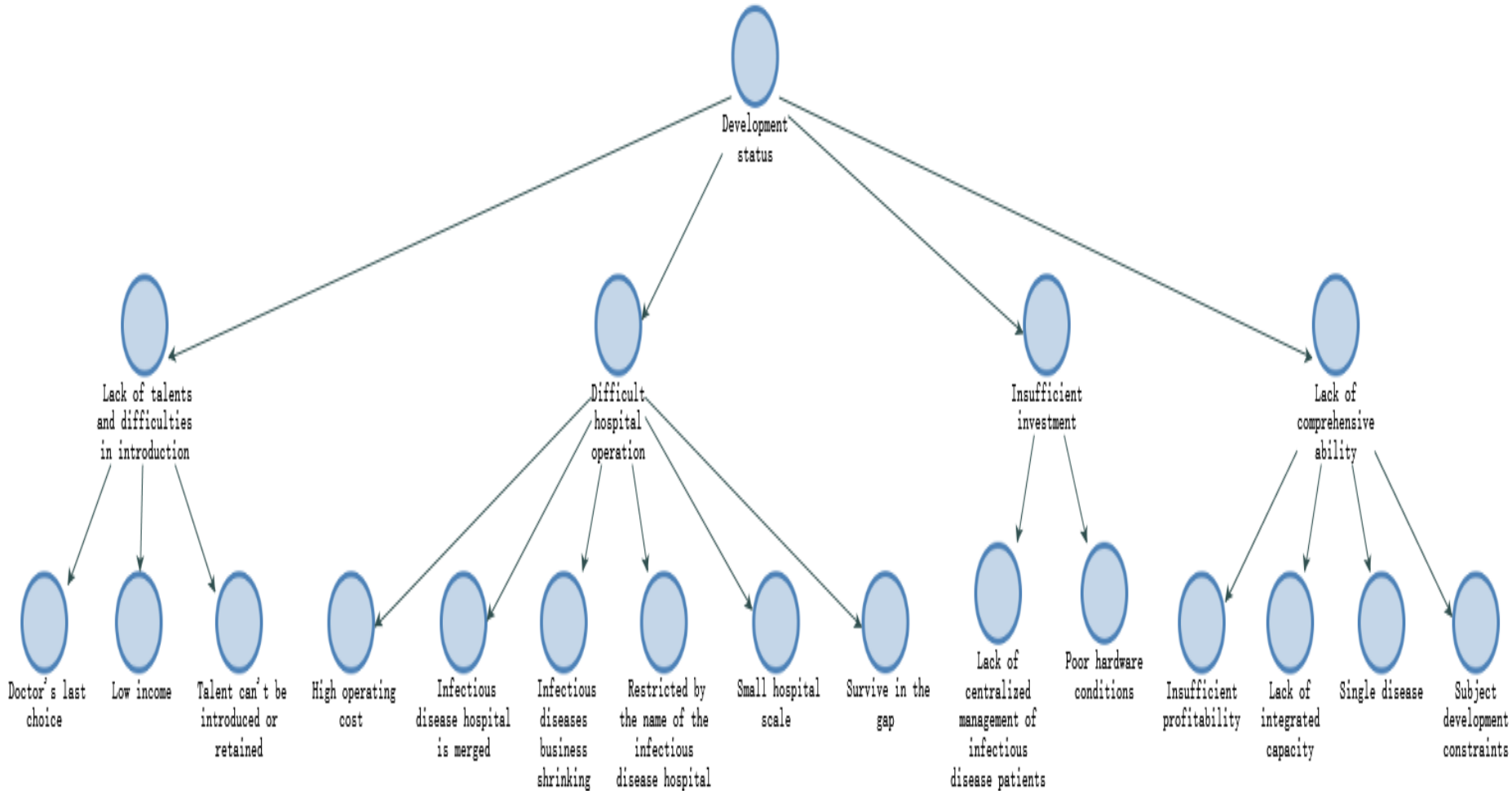

Figure 4-3 The hierarchy chart for status quo's coding

Table 4-2 Examples of infectious diseases hospitals' current situation

Hospitals	Examples
Shanghai Public Health Clinical Center	"The greatest challenge is to build up our talent echelon." (President) "The major difficulties are low income, scarce talent resources and limited development." (Vice president) "The biggest challenge is to build up comprehensive treatment capability for infectious diseases." (Vice president) "If salaries and welfare are not good enough to retain talents, the operation of the hospital would be negatively affected and this will affect others' choice in working here." (Deputy party secretary) "The problems of specialty limitation, talent disengagement and inadequate welfare do exist. Jinshan branch is large, but is far away from downtown and has a high cost." (General accountant)
Chongqing Public Health Medical Center	"The challenges are insufficient investment from government, loose centralized management, weak capability of comprehensive clinical treatment, we have difficulty in attracting talents and see high talents mobility." (Member of the party committee) "There is a huge gap between the hospital and general hospitals in terms of facilities and equipment." (Vice president) "The government does not have sufficient investment and policies to support the development of hospitals for infectious diseases." (Vice president) "In fact, I think the challenge and difficulty of hospital's development depends on whether government pays enough attention to it." (President)
Wuxi Fifth People's Hospital	"We have always been facing the difficulties of attracting talents. We are too strong in certain specialty but weak in comprehensive diagnosis and treatment and intensive emergency handling." (Vice president) "The challenge is to support comprehensive disciplines and talent inflow." (Vice president) "The government and health authorities are not clear about the functions of infectious disease hospitals." (Director of Administrative Office)

	"We lack government support and investment, so it is difficult to survive." (President)
Yancheng Second People's Hospital	"For years, centralized management of patients with infectious diseases are not implemented fully and specialist facilities are old." (Vice president) "We have improper talent echelon and poor facilities and equipment." (Vice president)
Harbin Sixth People's Hospital	"We lack government support and talent team, and it is hard to survive." (Chief of Medical Education Department) "Our disciplines are not well-developed so the level of specialties of our hospital does not have any advantage over other university affiliated hospitals. We cannot retain the talents because of the bad economic condition and employees are aging." (President) "Heilongjiang province has a tight financial budget. We have limited government support or are even marginalized. If it is without financial support, it would be hard for hospitals for infectious diseases to survive and we would quickly bring an end to ourselves." (Vice president)
The Fourth People's Hospital of Zunyi City	"It's mainly a matter of salary and welfare. Government must invest, especially in talents." (Vice president) "Investment is the greatest issue. Although local government pays more attention to the public health condition because of the pandemic outbreak, there are still rooms for down-to-earth implementation." "We are weak in overall disease treatment. But we contribute more to the treatment of AIDS as a hospital for infectious diseases rather than other disciplines." (Deputy party secretary) "Our facilities and equipment are old, and we have limited land resource to expand our hospital." (Member of the party committee)
Shanghai Fengxian District Guhua Hospital	"We are faced with an embarrassing situation. Should government put hospitals for infectious diseases into public health system?" (Member of the party committee) "It puts pressure on us as comprehensive hospitals also accept patients with liver diseases." (Vice president of medical treatment) "Our hospital has poor facilities and equipment. Because of limited space, we were not listed as a hospital for COVID-19 quarantine." (Director

	of Administrative Office) "Infectious disease is the worst branch of internal medicine. After standardized training, medical students work in the tertiary hospitals, so we even didn't hire one clinician in the past decade." (Vice president) "We should cancel medicine makeups, but we lack sufficient subsidy from the government." (president)
Shanghai Pudong New Area Infectious Diseases Hospital	"Insufficient attention and investment from the government result in talent outflow. It's difficult for infectious diseases hospitals to retain talents." (Vice president) "The general environment is not good because of inadequate investment on hospital's facilities and equipment and the lack of large-scale equipment. We don't have negative pressure beds or even pipelines." (Secretary of the Communist Party of China)

4.3.2 Core competitiveness of infectious disease hospitals compared with general hospitals or specialized hospitals

Although most hospitals for infectious diseases are still trapped in dilemma because their clinical treatment and scientific research capabilities are far behind the requirements of government and patients. the leaders all attach importance to the development of their own core competitiveness. As is shown in Table 4-3, compared with general hospitals, the core competitiveness of infectious disease hospitals mainly lies in the characteristics of infectious disease specialties, scientific research capability and specialized talents.

Table 4-3 Core competitiveness of the infectious disease hospitals

Hospitals	Examples
Shanghai Public Health Clinical Center	"We have rich experiences in emergency management with transformation of scientific research a bright spot, and our income from the transformation ranks the first among hospitals in China. We have advanced research teams and scientists who are the best at identifying viruses and bacteria. Our hospital is the largest medicine clinical trial base in China." (President) "Early detection and diagnosis of unknown pathogens and treatment of infectious diseases." (Vice president) "Our hospital has the longest history among infectious disease hospitals, and the unique hospital culture is also a kind of core competitiveness, which is the most different from other hospitals." (Deputy party secretary) "The treatment of liver disease, AIDS and tuberculosis are our core competitiveness. The capability of scientific research transformation is

Hospitals	Examples
Chongqing Public Health Medical Center	ahead of others in China. We take the lead in budget management and cost control." (Chief accountant) "The most important ones are disciplines and talents. We should focus on cultivating our own talents." (Director of the department of medical administration) "New and emergent infectious diseases are the core. Without emergency functions, there are no differences between hospitals for infectious diseases and general hospitals. Then hospitals for infectious diseases are of little value." (Vice president of logistics) "Medical level, capability of medical treatment and scientific research, talents, specialty development of special diseases." (president) "We can be better prepared to deal with new outbreaks of infectious diseases and other infectious diseases. We have specific wards for infectious disease patients. We have strong sense of management and are more professional." (Vice president) "Our hospital is a professional institution for prevention and treatment of infectious diseases which is our characteristic." (Vice president of logistics)
Wuxi Fifth People's Hospital	"The clinical treatment level of infectious diseases is the core competitiveness." (president) "We have to develop based on our own characteristics as a specialized hospital." (vice president) "For hospitals, core competence is the talents." (vice president) "It should be particularly shown in hospital management, construction of infectious disease network system, and technical and academic advantages of characteristic specialties, such as early warning, prevention and control, and laboratory diagnosis of infectious diseases." (Director of Administrative Office)
Yancheng Second People's Hospital	"The core competence is definitely infectious disease discipline, especially infectious disease diagnosis, treatment and management." (Vice president)
Harbin Sixth People's Hospital	"For our hospital, the core competence is infectious disease discipline." (President)
The Fourth People's Hospital of Zunyi City	"In addition to professionalism, we exceed in prevention and protection." (Member of the party committee)
Shanghai Fengxian District Guhua Hospital	"Our medical level is among the best in Shanghai's districts." (vice president) "In recent years, we have improved our scientific research capability and obtained more projects and articles than in previous years. In Fengxian District, as scientific research projects are finished on time and scientific research funds are used properly, scientific and technological committee increases the indicators of projects." (Member of the party committee)

Hospitals	Examples
Shanghai Pudong New Area Infectious Diseases Hospital	"Core competence is not obvious generally. It can only be shown in suburban areas." (Vice president)

4.3.3 Strategic adjustment of hospitals for infectious diseases in recent years

Since 2000, managers in most hospitals for infectious diseases, whether in tertiary hospitals or secondary hospitals, have realized that as there is less demand for infectious diseases services, hospitals must adjust their developmental strategies. They put forward such strategies as Know Everything About Specialties and Know Something About Everything, which means that with the foundation of being specific in infectious diseases specialty, hospitals should speed up the development of general disciplines so as to make sure that patients with infectious diseases can receive multidisciplinary treatments including internal, external, gynecology and pediatric disciplines. By using NVivo 12 software, the node coding graph of strategic adjustment (Figure 4-4) shows that the top 10 hospitals with the most nodes include Shanghai Fengxian District Guhua Hospital, Harbin Sixth People's Hospital, Shanghai Public Health Clinical Center and the Fourth People's Hospital of Zunyi City which are the interview objects in this research.

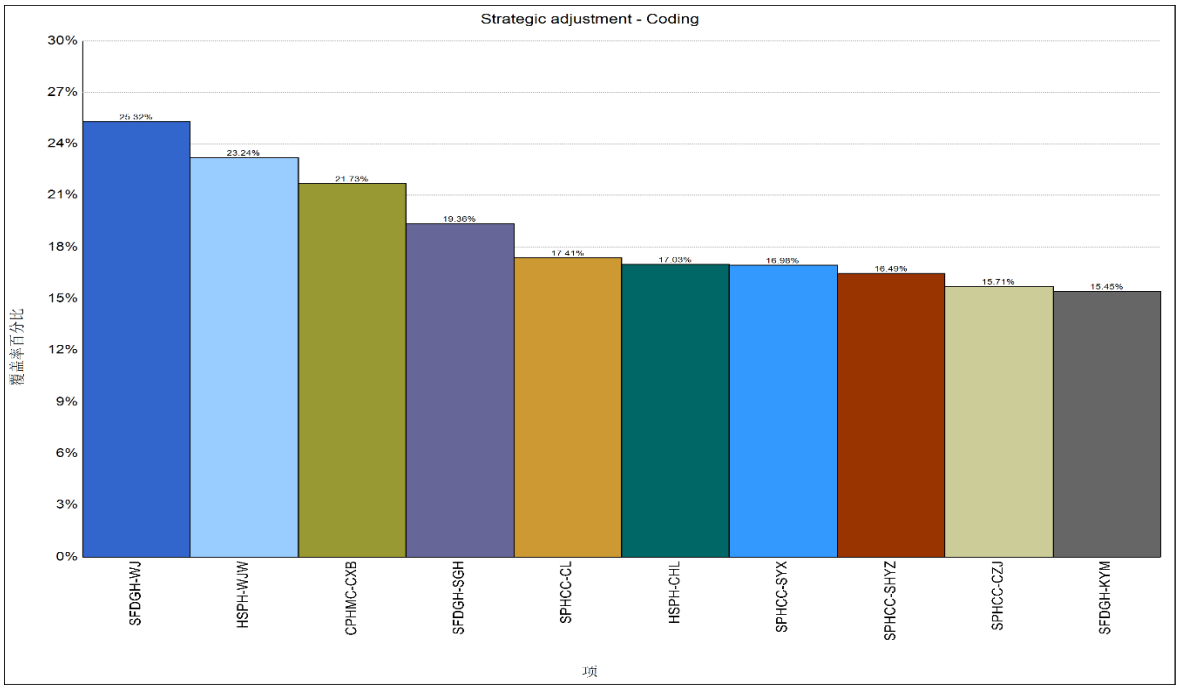

Figure 4-4 Node coding graph of strategic adjustment

According to the analysis of the interview materials, these 4 hospitals are the most representative hospitals in terms of strategic development among 8 cases (Table 4-4). The Explore diagram for strategic adjustment (Figure 4-5) illustrates approaches of strategic adjustment approaches to strategic adjustment.

Table 4-4 Examples of hospitals' strategic adjustment

Tactics used	Shanghai Public Health Clinical Center	Harbin Sixth People's Hospital	The Fourth People's Hospital of Zunyi City	Shanghai Fengxian District Guhua Hospital
Business expansion	"Infectious diseases discipline must be expanded and strengthened. Our hospital has made a lot of adjustments according to the changes in environment and disease spectrum. Now the external department is better. The medical industry is also on the right track." (Head of the department of medical administration) "According to the statistics of previous two years, the GCP revenue was 270 million in 2018, and 140 million in 2019. Good Clinical Practice (GCP) is a huge business. The revenue from normal medical business in our hospital is 900 million. Business from surgical department accounted for 35% of the total business last year. Improving overall capacity ensures patients' safety and brings economic benefits, which is a positive strategic adjustment." (Chief accountant)	"After taking office, the new president has many ideas, like cooperating with Eastern Hepatobiliary Hospital." (Vice president) "We cooperate with the supervision detachment of Harbin Public Security Bureau, transforming one floor ward into a prison to receive and treat prisoners. We also cooperate with Eastern Hepatobiliary Hospital as it has great influence and attraction. Harbin people can do surgeries by experts from Eastern Hepatobiliary Hospital without traveling to other cities. Our hospital has enough space for hospice care ward for patients with advanced tumors." (President)	"Our hospital used to be a general hospital, but later developed into a hospital with three specialties, including AIDS, tuberculosis, and liver disease." (Vice president) "In 2019, our hospital merged Xinpu New Area People's Hospital and Xiazi Town Central Hospital and moved to new location for operation." (Vice president)	"The previous leaders kept thinking about the transformation of our hospital. Besides promoting the capability of infectious diseases treatment, we focus on the prevention and control of infectious diseases, physical examination and nursing for the old." (Vice president) "Even if we lack medical staff, should we still set up geriatric wards and do physical examination business? It is because our infectious disease businesses are insufficient, so we resort to other businesses as supplements." (vice president) "Less patients with infectious diseases force our hospital to turn to other businesses for survival. Infectious disease only is not enough and it cannot even support the payroll." (Vice president)
The maintenance of	"The survival rate of patients	"The only competitive	"Total reliance on	Not mentioned

Tactics used	Shanghai Public Health Clinical Center	Harbin Sixth People's Hospital	The Fourth People's Hospital of Zunyi City	Shanghai Fengxian District Guhua Hospital
developing general disciplines with traditional advantages	with infectious disease is apparently lengthened, but there exist a lot of complications. if there is only internal department in hospitals for infectious diseases, the survival rate of patients will be lowered. Now we are developing towards a general hospital with more attention to medicine, education, research and transformation." (Vice president) "The business capability of infectious disease hospitals should be more comprehensive and lay emphasis on certain fields." (Deputy party secretary) "Hospitals should be developed into a unicorn enterprise with comprehensive and unique medical diagnosis and treatment technology based on infectious diseases." (Member of the party committee)	advantage is to extend the road for development. It's not enough only to develop specialties. General disciplines should be expanded based on that. Since our new president has taken office, we set a strategic goal of developing Strong Specialty in Specific Disciplines with Comprehensiveness. To develop strong specialty in specific disciplines is to make them competitive. Our hospital can handle all the problems of patients." "Since 2018, our goal is to develop Strong Specialty in Specific Disciplines and Comprehensiveness. We must expand our business. I think a well-transformed hospital must have gone through this process. The development of general disciplines serves specialties. In such a fierce medical market, specialties, which has become our established advantage, cannot be abandoned." (President)	infectious diseases discipline makes it hard for hospitals to survive. We should develop general disciplines on the firm foundation of the prevention and control of infectious diseases as our own characteristics are essential. The development of general departments promotes the cultivation of talents. They are in fact mutually reinforcing each other." (vice president) "Hospitals for infectious diseases are not isolated as infectious diseases may trigger diseases in the whole body. If we are weak in internal and surgical disciplines, strong specialty in specific disciplines is impossible." (vice president) "As infectious diseases businesses are few, we should transform into the model of Strong Specialty in Specific Disciplines and High Comprehensiveness. Our hospital doesn't have a firm foundation, so it's important to develop specialty in specific disciplines and general business." (Deputy party secretary)	

Tactics used	Shanghai Public Health Clinical Center	Harbin Sixth People's Hospital	The Fourth People's Hospital of Zunyi City	Shanghai Fengxian District Guhua Hospital
Talent strategy	"We should try our best to attract talents. The scientific research team should attract the international top talents. Talents are always the first. A hospital without talent echelon equals to zero. We should strive to build up a medical team for public health emergency which can attract more talents." (President) "During the pandemic of COVID-19, I think we did well in intensive treatment as we have attracted talents from respiratory discipline. Our hospital has reserved more talents than the last few years, so we are able to handle small-scale emergencies. It is only when there is a large outbreak that the whole city needs to be mobilized." (Vice president) "I think the development of disciplines depends on talents. Introduction and cultivation of talents are important. I have worked in this hospital for more than ten years, and our hospital provides many training opportunities for me. We also introduce advanced talents on a large scale." (Head of the department of medical administration)	"I brought in a doctor with Ph.D. degree specialized in cardiovascular medicine to organize a department of general internal medicine. This doctor is the first doctor with a Ph.D. degree in our hospital. I think these all help to cope with the COVID-19 outbreak." (president) "Our president makes every effort to introduce talents and strengthen our hospital. After bringing in a doctor for cardiovascular medicine, we can attract more talents to join. A hospital can become famous with famous doctors." (Vice president)	Not mentioned	"What if we lack talents but they are not willing to come? We can only cultivate our own employees. In these two years, we recruit talent who can train our employees as a teacher. We have taken a lot of measures to increase talents reserve. We should first have talents when it comes to the development of our hospital." (Vice president)
Transformation of	Not mentioned	Not mentioned	"Compared to general	"According to the

Tactics used	Shanghai Public Health Clinical Center	Harbin Sixth People's Hospital	The Fourth People's Hospital of Zunyi City	Shanghai Fengxian District Guhua Hospital
hospitals			hospitals, hospitals for infectious diseases are weaker at general disciplines. As our hospital is transformed from a general hospital, our capability for infectious diseases treatment is comparatively weak. Another one is concerned with the development of hospitals for infectious diseases." (Vice president)	regional development plan of Fengxian District and the changed plan after COVID-19, our hospital will focus on rehabilitation, geriatric care and various physical examinations. A hospital for infectious diseases will gradually develop into one for geriatric care." (Vice president)
Applicability in peacetime and wartime	"How should we train talents at ordinary times? There is no way to cultivate practical ability of talents without business of infectious diseases. Now the spectrum of infectious diseases is changing. New infectious diseases are bound to come, which poses a challenge to hospitals." (Head of the department of medical administration) "The strategic direction of public hospital is decided by city officials, which requires us to become a hospital with applicability in peacetime and wartime. Emergency work needs to be done well. Public Health Clinical Center is shouldered with political responsibility, so all work needs to be done in accordance with applicability in	"Our hospital cannot totally support the fight against COVID-19. There are only 550 beds which are enough at ordinary times. But it's crowded and insufficient when dealing with COVID 19. The number of patients accepted has reached over 460. The municipal government knows that and call for infectious disease hospitals to enhance the capacity for all pandemics. We must build a hospital that has 1000 beds and a coverage area of 100 thousand square meters with applicability in peacetime and wartime." (Vice president)	"Hospitals for infectious diseases should have applicability in peacetime and wartime just as Public Health Center. This will help to grow business." (Member of the party committee) "We should give priority to and develop general disciplines, such as internal and surgical, gynecology, pediatrics oral cavity, and ENT departments. Then we should enhance our specialties, especially core competence. During wartime, general departments can in turn support specialties. Just as during the pandemic, internists, emergency physicians, respiratory physicians and ICU physicians	"In ordinary times, doctors for infectious diseases have to practice their skills in business, or they will be obsoleted." (Vice president)

Tactics used	Shanghai Public Health Clinical Center	Harbin Sixth People's Hospital	The Fourth People's Hospital of Zunyi City	Shanghai Fengxian District Guhua Hospital
	peacetime and wartime." (Vice president) "Hospitals should advocate applicability in peacetime, wartime and have more practice at ordinary times and raise the general business capability, so as to be better prepared for emergencies in wartime and to provide favorable treatment for patients in infectious disease hospitals." (Deputy secretary) "The hospital takes a different way and becomes a research-oriented hospital really driven by scientific research." (President)		all have to work in the wards, which really shows applicability in peacetime and wartime." (Vice president)	
Scientific research	"According to the regulations issued by higher authorities, research investment should account for no less than 2% of the medical business income. In fact, research investment accounts for 6% in the past two years, and the budget for 2020 reaches 5.6%, which is far higher than the average level. I hope scientific research can be productive which is a part of strategic adjustment." (Chief accountant)	"Scientific research has not been carried out in recent years as it costs a lot." (Vice president)	Not mentioned	Not mentioned
Cadre management	"To build up a team of middle-level cadres, we should give them a free hand and let	Not mentioned	Not mentioned	"Some of the old middle-level cadres were gradually replaced last

Tactics used	Shanghai Public Health Clinical Center	Harbin Sixth People's Hospital	The Fourth People's Hospital of Zunyi City	Shanghai Fengxian District Guhua Hospital
	them take the responsibility with courage." (Vice president)			year. We want to build a platform for young people with ability and active thinking. In the past two years, each department has had more employees, forming talent echelons of different ages. If we continue the old way of management, it's hard to manage it well." (Vice president)
Building medical treatment alliances	"Our hospital has established the Alliance of Infectious Disease Hospitals in the Yangtze River Delta. We often hold academic activities and we sent our clinical department director to assist infectious diseases hospital as vice president. Our hospital has joined the medical treatment alliance of Zhongshan Hospital. Zhongshan Hospital also sent medical teams to assist us." (president) "Medical treatment alliance, especially the integration in Yangtze River Delta are national strategies. Hospitals have to work on responding the strategies." (Vice president)	"Through medical treatment alliance, we are getting familiar with each other. It's like communicating with each other in a big family." (president) "Medical treatment alliance is a self-help method. Let more low-grade hospitals join the medical treatment alliance. When more people are involved with louder voice, the easier it is for us to succeed. Low-grade hospitals also need guidance from higher authorities." (Vice president)	"We should attach ourselves to the Shanghai Public Health Clinical Center and establish a compact medical treatment alliance united with our own departments. We must give compact assistance so as to improve the overall technology." (vice president) "The concept of medical treatment alliance is more valuable than that of global medical communities and a community with a shared future. It turns an extensive alliance into a loose medical treatment alliance and then into a compact one. From the recent cases, I feel that only when the community of interests makes a great change	"In 2018, the Alliances for Infectious Diseases has been established in the district. As a leading hospital, 21 community health service centers were jointly connected with us. We hope patients with infectious diseases in the district can be transferred in time after the establishment of medical treatment partnership." (vice president) "Our hospital is also actively participating in the partnerships of tertiary hospitals, including the medical treatment alliance for the prevention and control of infectious

Tactics used	Shanghai Public Health Clinical Center	Harbin Sixth People's Hospital	The Fourth People's Hospital of Zunyi City	Shanghai Fengxian District Guhua Hospital
			in management can systems and mechanisms stay." (Deputy party secretary)	diseases in the Yangtze River Delta, the alliance specific for infectious diseases, the alliance for the diagnosis and treatment of tuberculosis, and the Alliance of Lung Disease in the Yangtze River Delta." (Vice president)
Quality of medical care	"Be a bigger and stronger hospital is not only about volume, but also about quality." (Head of the department of medical administration)	Not mentioned	Not mentioned	"Quality of medical care is the core. First of all, to improve the quality and then to expand business." (Vice president)
Differentiated competition	"Hospitals for infectious disease should never give up the advantages and strategies of giving priority to infectious diseases. We should let general disciplines serve the business of infectious diseases. We should make full use of the advantages of minimally invasive technology, and have competitions with general hospitals in other aspects to win more space and time for wars." (Vice president)	Not mentioned	"We are outstanding at AIDS discipline because general hospitals are unwilling to do and give it to us." (Deputy party secretary) "There is not enough subsidy from government. We have to depend on our own so that we have core competence that are lack by general hospitals." (Vice president)	"We are developing towards geriatric medical care. We can only have dislocation competition, or it's hard to survive." (vice president) "It is difficult to compete with general hospitals. Only with dislocation competition can we show our advantages. The district central hospital develops the high-end physical examination, while our hospital does occupational physical examination for enterprises, forming a virtuous circle. It's very hard to win the competition as a specialized

Tactics used	Shanghai Public Health Clinical Center	Harbin Sixth People's Hospital	The Fourth People's Hospital of Zunyi City	Shanghai Fengxian District Guhua Hospital
				hospital." (Vice president)
Internationalization strategy	"Our hospital set up national travel medical department. It turns out that patients from 16 countries were accepted by our hospital for treatment during the pandemic. We are going international." (president) "We should integrate effective advantages at home and abroad, and make appropriate strategic adjustment for our own hospital." (Head of the department of medical administration)	Not mentioned	Not mentioned	Not mentioned
Innovative development	"Only if leader teams have new ideas, new direction for development and new technologies can hospitals for infectious disease get out of the troubles." (Vice president)	Not mentioned	Not mentioned	Not mentioned
Publicity strategies	"We pay more attention to publicity now. In the past, we did a lot work, but barely publicize ourselves." (Head of the department of medical administration)	Not mentioned	Not mentioned	Not mentioned

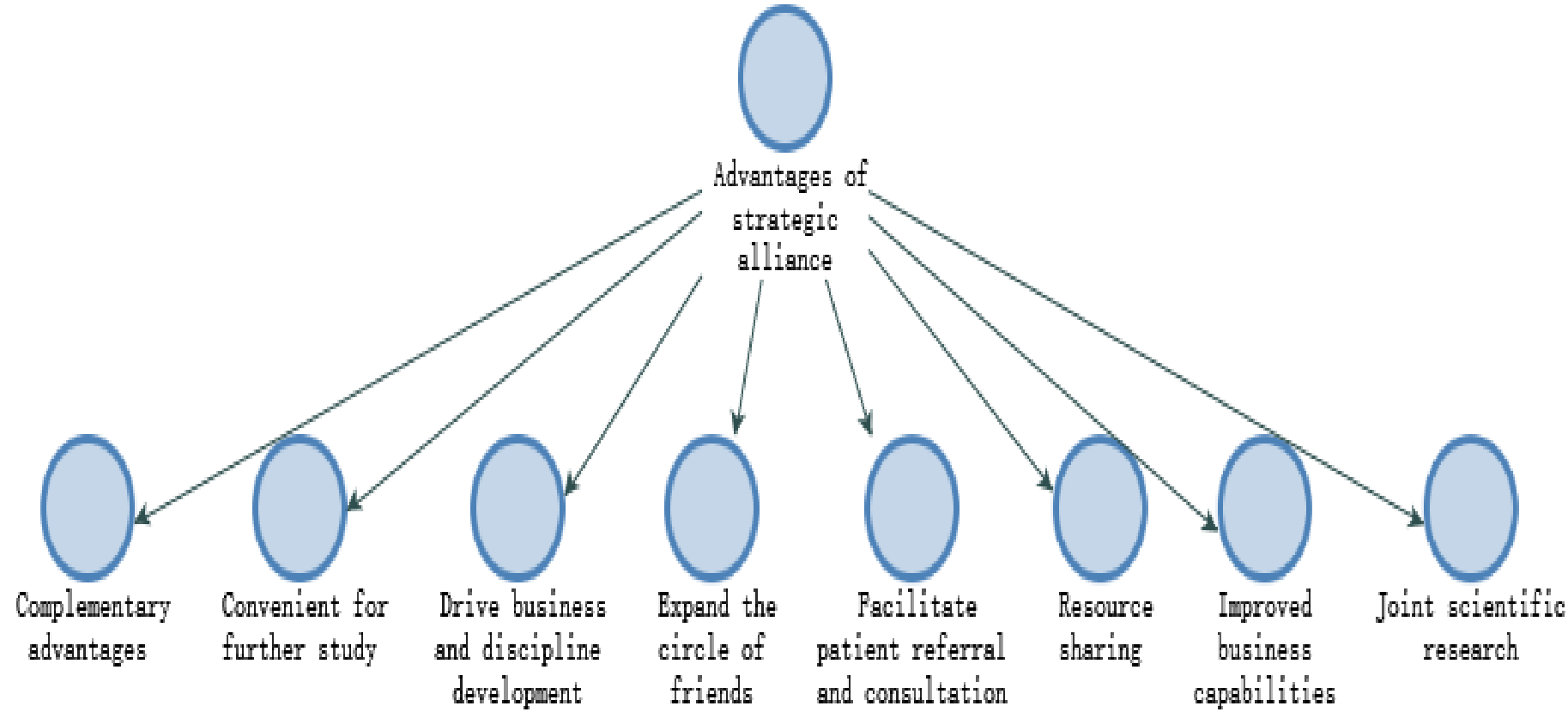

Figure 4-5 Explore diagram for strategic adjustment

4.3.4 Effects, problems and solutions of the establishment of strategic alliances and medical treatment alliance

In the past decade or so, in order to deepen the reform of medical and health system and show professional and technical advantages and the leading role of tertiary hospitals, China has greatly supported the establishment of Medical Treatment Alliances, which is a form of SAs. The eight hospitals in this research all join medical treatment alliances. This research uses NVivo 12 software to analyze the qualitative interview materials. As is shown in Figure 4-6 and Table 4-5, the implementation of medical treatment alliances has the following advantages. It's convenient for patients to transfer and consult for treatment, and for employees to study and receive training. It can drive the development of discipline and business, and the scientific research cooperation. Hospitals can share resources, show complementary advantages to expand friend circle.

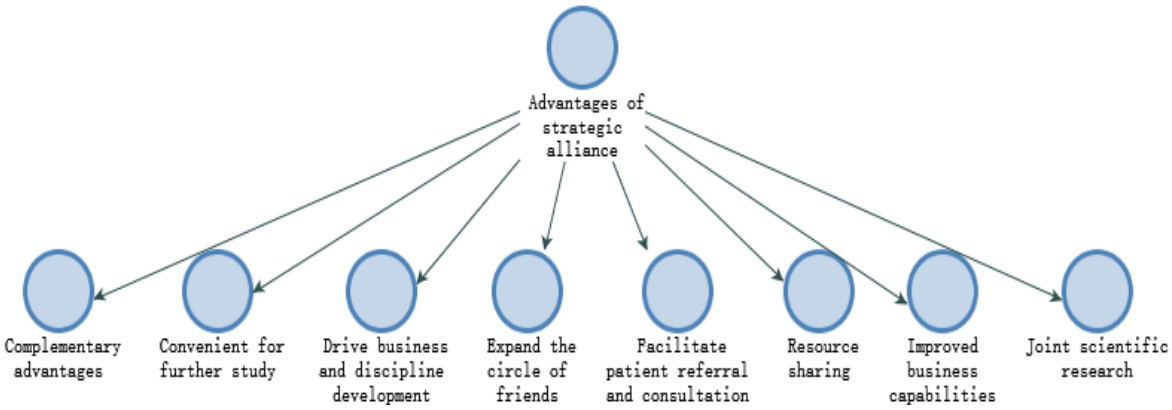

Figure 4-6 Explore diagram for advantages of strategic alliances

Table 4-5 Examples of advantages of strategic alliances (medical treatment alliance)

Advantages	Examples
Convenience for patients to transfer and consult for treatment	"Under the framework of medical treatment alliance, we have a good dual referral system, which can promote the medical treatment in our district." (vice president of SFDGH) "In the medical treatment alliances of Heilongjiang, Jilin and Liaoning province, some hospitals will transfer treatment for patients through consultation." (President of HSPH) "We will enhance the ability of diagnosis and treatment for pure internal medicine. There are not many patients in critical condition, and we will organize consultation when we have one." (Vice president of SPNAIDH)

Advantages	Examples
	"In medical treatment alliances, it is convenient for patients to get referral, which can really play its role." (Deputy secretary of SPHCC)
	"Expert consultation, ward rounds and consultation do make a difference on referrals for patients. We should enhance the ability of community doctors to have early identification and management of infectious diseases." (Vice president of WFPH)
	"Through the green channel of two-way referral, more than 20 AIDS patients in need of surgery were transferred to SPHCC for surgical treatment, which solved the problem that some AIDS patients could not receive surgeries in our hospital." (Vice president of YSPH)
	"The main function of medical treatment alliance is to provide convenience for the referral of patients. Critical patients for infectious diseases can transfer up and down after their condition is improved." (Vice president of CPHMC)
	"The medical treatment alliance can help relatively weak specialized hospitals like our hospital to enhance the ability of talents and technology, so that people can enjoy Shanghai's high-quality medical resources without long-distance travel." (Vice president of ZFPH)
	"The most obvious benefit of medical treatment alliances is that it is convenient for employees to study and receive training." (vice president of Fengxian District Guhua Hospital)
	"Beijing Ditan Hospital solved the further study problem of our hospital's doctors." (Vice president of HSPH)
Convenience for employees to study and receive training	"Medical treatment alliances organize relative continuing education in terms of education and training and give us great support." (Deputy party secretary of SPNAIDH)
	"Medical treatment alliances are more about academic exchanges." (vice president of SPHCC)
	"We will participate in some of the academic activities held by medical treatment alliances." (Vice president of WFPH)
	"Holding academic activities together receives good feedback and is very effective." (Director of YSPH)
Driving the development of discipline and business	"Medical treatment alliance is a self-help method. It can let more low-grade hospitals join the medical treatment alliance. When more people are involved with louder voice, the easier it is for us to get things done." (Deputy director of HSPH)

Advantages	Examples
	"Shuguang medical treatment alliance changed a lot. We are improving disciplinary construction every year. It promotes community training and TCM service capability." (Vice president of SPNAIDH)
	"Zhongshan Hospital provides technical support to our hospital and sends professional teams to train our talents. When we ask for help, Zhongshan Hospital will solve some of our problems." (Deputy party secretary of SPHCC)
	"It can effectively coordinate, integrate and optimize high-quality medical resources of all medical and health institutions in the alliance, move down the high-quality medical resources, promote the rational allocation of medical resources, and improve the medical service capacity and discipline talents of primary medical institutions." (Vice president of CPHMC)
	"Primary health services have gained more attention. Medical consultations and the utilization rate of beds have been increased. The public becomes more satisfied. All of these promote the establishment of a rational medical order." (Deputy director of YSPH)
	"The investment of personnel, technologies, capitals and equipment will promote the development of primary hospitals." (Deputy director of ZFPH)
	"Our hospital participates in some common research projects." (Director of Administrative Office from SFDGH)
	"We established medical treatment alliance with Chuansha area and we do projects together." (Director of SPNAIDH)
Driving scientific research cooperation	"Only by introducing foreign advanced new medical schemes, technologies and concepts, and promoting and using them in medical treatment alliances, can we achieve the goal of improving the capacity of infectious diseases treatment and raising the scientific research level." (Deputy director of SPHCC)
	"Under the guidance of SPHCC, our hospital has greatly promoted our disciplinary construction." (Deputy director of YSPH)
	"Shanghai Public Health Clinical Center guides our hospital to do scientific research together. This is very helpful. There are diseases in the western regions that Shanghai does not have, so we can have scientific research cooperation." (Deputy director of ZFPH)
Resource sharing	"The management of our hospital's blood bank relies on data sharing

Advantages	Examples
	of medical treatment alliances, supply departments and iconography." (Deputy secretary of SPNAIDH)
	"It is effective at certain levels as for the integration of medical resources for infectious diseases. We have more medical resources which are helpful for standard setting, facilities, homogeneous diagnosis and treatment." (Director of CPHMC)
	"We get familiar and communicate with each other in a big family." (Deputy director of HSPH)
Expanding circle of friends	"The biggest benefit is to expand our circle of friends. If we are good friends, we can help and support each other. It does have some effects and expands our circle of friends." (Head of the department of medical administration, SPHCC)
Complementing advantages	"Infectious disease hospitals are a group, generally at a disadvantage among all hospitals. If hospitals for infectious disease want to excel general hospital in competition, we must establish an alliance with others, which can bring us complementary advantages, and is consistent with the current trend." (Deputy director of SPHCC)
	"Making use of group power is beneficial to specialty development. It is particularly conducive to the improvement of personnel quality when the upper and lower groups connect closely with each other and have a clear way of direction." (Deputy director of YSPH)

There are still some problems for hospitals to build up medical treatment alliances. This research uses NVivo 12 to analyze and summarize the qualitative interview materials as is shown in Figure 4-7 and Figure 4-8. The implementation of medical treatment alliance has the following major problems and the author comes up with corresponded suggestions and solutions (Table 4-6).

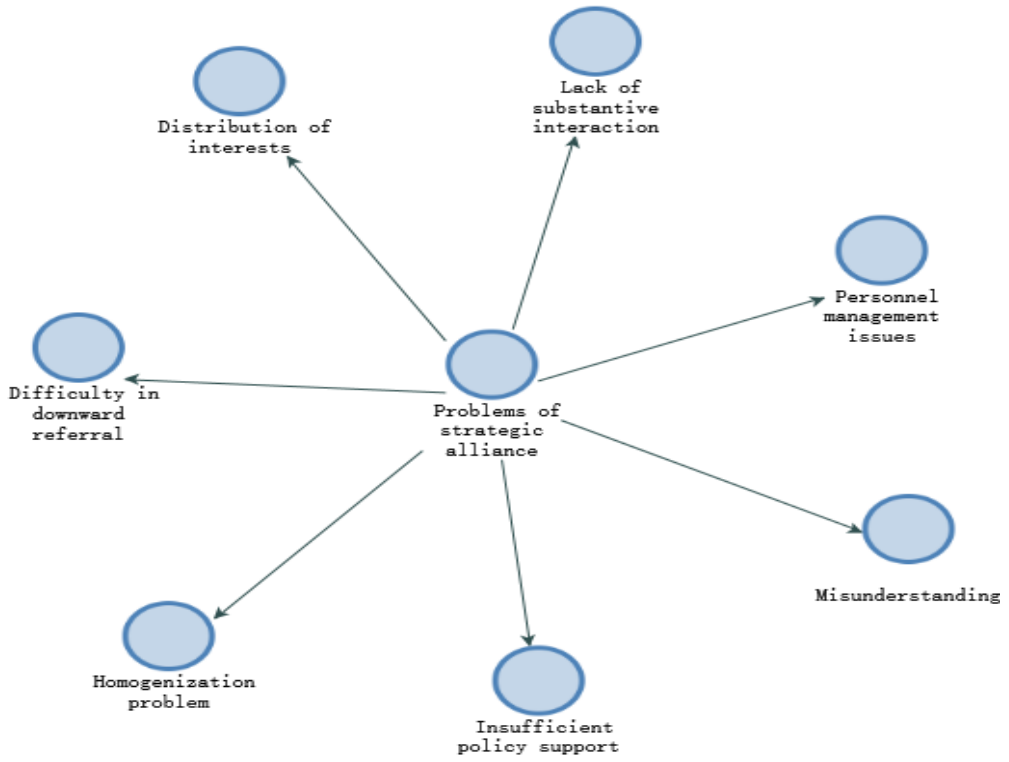

Figure 4-7 Problems of medical treatment alliances

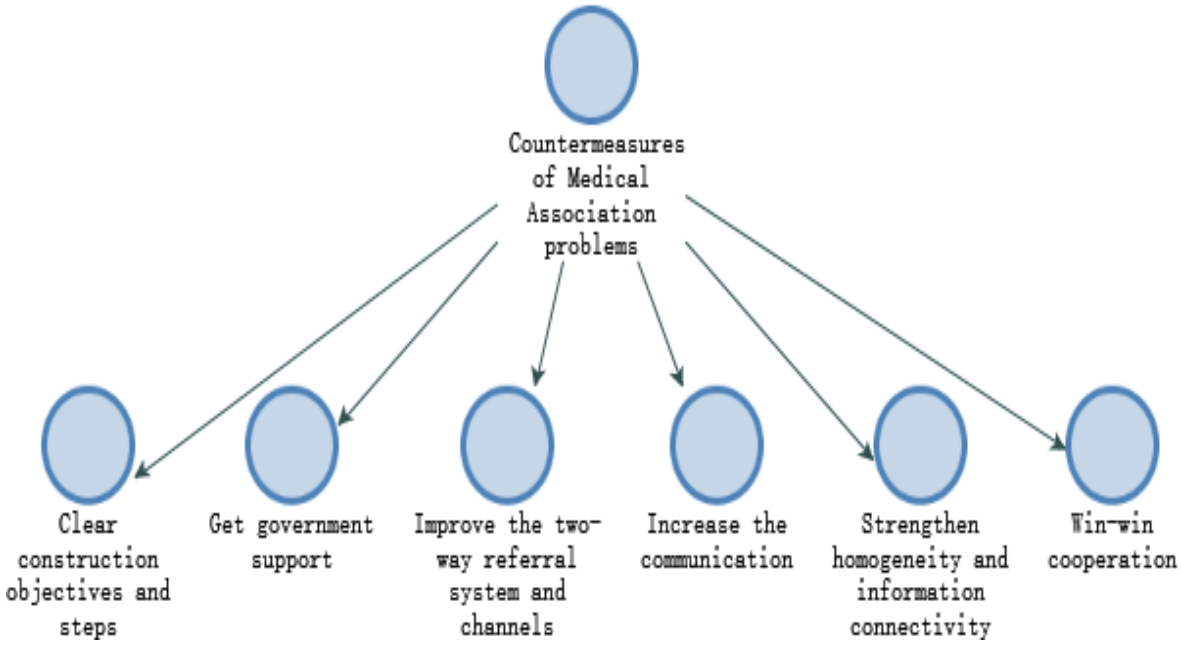

Figure 4-8 Solutions to the problems of medical treatment alliances

Table 4-6 Problems of medical treatment alliance and solutions

Problems	Examples	Solutions	Examples
Lack of substantive interaction	"Lacking communication and infrequent meetings, being formalistic, no substantive content in communication. And this relationship needs to be maintained." (Vice President of HSPH) "The alliance is more of a formality than something having real effects, and effective organizations in the alliances are relatively loose. Hospitals do not pay enough attention to the medical treatment alliance, and have not yet developed the awareness and goals of common improvement." (Vice President of SPHCC) "The actual coupling effect of medical treatment alliance is insufficient. The medical treatment alliance is relatively loose at present, and it mainly involves academic exchanges. Substantive interaction in medical treatment alliance is needed. If there is not much interaction, it will not deliver practical effects." (Vice President of SPHCC) "Unable to find the goal of common struggle, incapable of identifying the converging point of common interest, loose structure, lacking long-term mechanism." (President of WFPH) "The exploration of the influence of the power of the group on the policy, the nation, and the society and politics of the nation is far from sufficient." (President of CPHMC) Now the medical treatment alliance is very loose, and is promoted in an unfeasible and aimless manner." (Vice President of ZFPH) "A loose medical treatment alliance is not very helpful. Without the restriction of rights and obligations, it can only provide consultation services,	**Enhance communication and define construction objectives and procedures**	"We must strengthen the medical diagnosis and treatment alliance and teams must be led to various health centers to form closer connections and deliver some effects." (Member of Party Committee, Fengxian District Guhua Hospital) "It depends on how the member units promote it. If they attach great importance to the medical treatment alliance, they will take turn to hold activities. If it had not been for the COVID-19, our hospital should have undertaken the activity this time. But I think our hospital will definitely hold it this year." (Vice President of HSPH) "There must be more communication between member units." (President of HSPH) "In medical treatment alliance, there should be more communication between hospitals in disadvantaged positions." (President of SPNAIDH) "More communication is needed. Our hospital is authoritative in the field of liver diseases. When consultation of doctors is hold, we play a key role in severe liver diseases." (Director of Administrative Office, SPNAIDH) "Medical treatment alliance should strengthen the communication among managers, especially at the technical level. The technical staff of the higher-level medical treatment alliance should participate in the administrative management of the lower-level medical treatment alliance, such as the nominal Director of Department and take a temporary post of the business President of hospital." (Member of Party Committee, SPHCC) "Mainly through enhancing communication,

Problems	Examples	Solutions	Examples
	and has not progressed very well in the real sense." (Vice President of ZFPH) "Unlike the grass-roots medical treatment alliance that plays a leading role, the connections among hospitals in the Yangtze River Delta that are not very bad do not seem very tight. All hospitals should be together like a family and point of strength must be identified." (Director of Department of Medical Administration, SPHCC)		strengthening guidance, and reinforcing liaison, including diagnosis and treatment." (President of CPHMC) "The medical treatment alliance is just like living at home. Someone has organized it, but this organization must hold activities regularly to prevent it from becoming merely a formality and have substantive content. Hospitals for infectious diseases should unite together to form a joint force and strive for policies that are favorable to infected patients." (Vice President of HSPH)
Benefits distribution	"We do not want to transfer all patients to other hospitals, because every hospital needs to have patients. If patients are transferred away, doctors are not able to improve their professional level. In terms of sharing achievements, we cannot just be a porter, but a participant." (Vice President of SFDGH) "They all start from their own interests and thus have different needs. As there are differences in hospital management and performance, if a win-win situation cannot be ensured, it is hard to continue. Under the medical system, a completely compact medical treatment alliance will also suffer various problems." (Deputy Secretary of SPNAIDH) "Different medical institutions belong to different departments, thus leading to divergent interests. It is difficult to realize a unified management, which restricts the reasonable sharing of responsibilities and benefits, and resource sharing within the medical treatment alliance." (Vice President of YSPH) "The responsibilities of different medical institutions are not clear, or the distribution of benefits is uneven. There are phenomena of competing for	**Win-win cooperation**	"Only by being professional and authoritative in any field can a hospital lead other hospitals. There is also the need to hold meetings and lectures, not just by one institution independently, but through joint consultation and construction to achieve shared benefits." (Director of Department of Medical Administration, SPHCC) "Eliminate the uneven distribution of benefits; establish a reasonable benefit distribution model of medical treatment alliances; complete the distribution of collective benefits of medical treatment alliances; and build a reasonable community of common interests among all members." (Vice President of CPHMC) "Members of a medical treatment alliance are justly brothers who should support each other to achieve a win-win situation. The medical treatment alliance of hospitals for infectious disease cannot go too fast and merge just because of poor operations. I think medical treatment alliance needs to have two lines, like two homes of brothers, to maintain a family relationship." (Vice President of WFPH)

Problems	Examples	Solutions	Examples
	interests" (Vice President of CPHMC)		
Difficulties in downward referral	"We are halfway through the two-way referral as it is easy to transfer patients out, but the patients are not transferred back. The downward transfer of the two-way referrals is a problem to be solved." (Vice President of SFDGH) "The hierarchical diagnosis and treatment have not been implemented well, and much needs to be done as for the upward referral and downward referral." (President of HSPH) "Patients have only been transferred to higher-level hospitals, but not been transferred back, thus causing siphon effect in patients. For specialized hospitals, there is great pressure on survival." (Deputy Secretary of SPNAIDH) "The medical treatment alliance is affiliated to and governed by different government departments, thus causing many problems, involving patient transfer and cooperation between lower- and higher-level hospitals, which cannot be done without government leadership." (Vice President of SPHCC) "There are more upward referrals than downward referrals. The diversion of patients and hierarchical diagnosis and treatment have not yet delivered obvious effect." (Vice President of YSPH) "The purpose of hierarchical medical system is not really achieved, and it is more of a formality than a substantive matter. The poor performance in two-way referral has something to do with the competition in the industry." (Vice President of CPHMC)	**Improve the two-way referral system and channels**	"Establish a strict two-way referral system within the medical treatment alliances; complete the system of two-way referral channels; unblock the two-way referral channel within the medical treatment alliances; and establish and improve the technical cooperation, responsibility system and cost settlement mechanism of hierarchical diagnosis and treatment in the medical treatment alliances. "(Vice President of YSPH) "The construction of informatization can somewhat contribute to two-way referral, but we are still exploring how to solve it thoroughly." (President of CPHMC)
Staff management	"As for how to enrich the connotation and how to cultivate doctors in the community health service	**Strive for government**	"The government and National Health Commission of the People's Republic of China should

Problems	Examples	Solutions	Examples
	center and village hospitals, what it has done is inadequate." (Member of Party Committee, SFDGH) "There are cultural differences between different member hospitals in the compact medical treatment alliance, and the starting points are distinct, which will lead to conflicts." (Vice President of SPNDIDH) "After outsiders come in, they still have deficiencies in cadre management and cultural unification, and will assume certain medical risks." (Chief Accountant of SPHCC) "Personnel of the medical treatment alliance have different educational backgrounds and cannot be directly managed, so it is difficult to reach unification in this issue." (Deputy Secretary of SPHCC) "The data and medical equipment of the two hospitals are mixed, and the settlement is not clear. After the general medicine department is entrusted, they have failed to cultivate relevant professionals." (Vice President of WFPH) "There are difficulties in how to manage the medical treatment alliance after it is established and how to improve the management and capacity of the grass-roots medical institutions." (President of YSPH) "During the implementation of hierarchical diagnosis and treatment system, medical staff in district-and county-level hospitals are trained and instructed, but their ability improves slowly." (Vice President of CPHMC) "The homogeneity between the medical treatment alliance and the alliance can also help improve the medical level." (Member of the Party Committee, SPHCC) "Information cannot be fully shared. You want to	**support**	advocate it vigorously. In terms of the realization of medical treatment alliance, the obedience of grassroots hospitals still requires the government to give orders, so that they have greater awareness of accepting it." (President of WFPH) "Unable to solve under the current system and mechanism, so we must seek the coordination and guidance from the government." (Director of Administrative Office, WFPH) "The inter-connectivity of information must be ensured." (Vice President of SPNAIDH) "Complete and unified online management information files are established within medical treatment alliances, so that patients' medical conditions

Problems	Examples	Solutions	Examples
Homogenization and informatization	access information in grass-roots hospitals, only to find that information and drug sharing are not fully realized. Experts that are sent to the grass-roots hospitals for consultation feel that they have no part to play as there are few patients." (Vice President of WFPH) "The medical information and records are mutually inaccessible, and the examination and test results are not mutually recognized, resulting in increased medical costs for patients, which makes it difficult to achieve informatization and homogenous management." (Chief of Department of Medical Education, YSPH) "The medical treatment alliance has not yet achieved homogenization of medical quality. It is also too loose." (President of CPHMC) "Because there is no affiliation relationship between the member units of the alliance, the alliance has no binding mechanism and is very loose. There are no conditions for evaluating each other, or informatization support for interconnection." (Vice President of CPHMC) "Without the participation of the government in the strategic alliance of medical treatment alliances, many problems that are difficult to solve may lie ahead if a hospital complete it on its own." (Vice President of SPHCC) "There is a lack of funding for discipline construction in the advancement of the medical treatment alliances." (Vice President of SFDGH) "The flow of people is massive, and some supporting policies are needed. It is difficult to do without putting it into place." (Deputy Secretary of	**Strengthen homogenization and the inter-connectivity of information**	are readily accessible to all member units, and real-time communication and cooperation between the upper-level hospitals and the grass-roots medical institutions within the medical treatment alliances are realized. A specific online resource service platform should be built through the internal informatization of the medical treatment alliance to promote the communication of information among the member hospitals, so that the member hospitals are more closely connected." (Vice President of YSPH) "Telemedicine should be strengthened and the inter-connectivity of information should be ensured. Remote consultation should be improved and the standardization of two-way referral processes should be enhanced, including electronic health files and digitalization of disease diagnosis and treatment data." (Chief of Department of Medical Education, YSPH) "Our hospital can establish a close medical treatment alliance with the public health medical center, or even a medical care community, so that we could drive the development of hospitals, and have a great role in promotion within three or five years." (Vice President of ZFPH) "Medical treatment alliance needs government support." (President of HSPH) "Medical treatment alliance must be supported by the government. The Three-A hospitals and community service centers as well as the documents of National Health Commission of the People's Republic of China must be led by the government." (Vice President of SPHCC) "Only if the social insurance and commercial medical insurance change the current dominance of hospitals, and separate pricing and direct payment for

Problems	Examples	Solutions	Examples
	SPHCC) "It is not included in the infectious disease prevention and control system and does not have certain administrative functions." (Vice President of WFPH) "The medical treatment alliance is relatively loose. We have provided guidance opinions, but there is no mandatory regulation to require the community to implement them." (Vice President of WFPH) "Medical insurance policies are relatively backward; the interaction mechanism between the medical treatment alliances and the social medical insurance system is not clear; and medical insurance related policies cannot provide a reasonable management method. The existing administrative management system and the level of medical institutions in China are different, so that medical treatment alliance cannot proceed smoothly." (Vice President of CPHMC) "The government does not support it, and it relies on the hospital alone. Hospitals need to spend a lot of manpower, material resources and financial resources." (Vice President of ZFPH)		doctor services and other out-of-hospital diagnosis and treatment from the aspect of the payment mechanism, can the medical treatment alliance continue to develop healthily and sustainably." (Chief of Department of Medical Education, YSPH) "Medical insurance policies should be reformed, and an overall management system of basic medical insurance should be established. Institutional management system should be improved, and a community of responsibilities should be built. Medical treatment alliance should break the original administrative management system, and supervision separated from day-to-day operations should be implemented." (Vice President of CPHMC) "The vigorous advocation of the government is the core issue. The construction of medical treatment alliances will affect the structure and income of treatment. Without the government guarantee, hospital administrators have to consider the healthy operation of the hospital as there is no room for revenue generation." (Deputy Secretary of ZFPH) "With the attention of the leadership of the District Health Commission, a budget of 480,000 yuan was allocated this year for the construction of medical treatment alliance, including training, academic exchanges, and remunerations for professors who will instruct students, so the funding pressure is relatively relieved." (President of SFDGH)
Insufficient policy support		**Seek policy support**	
Misunderstanding	"Some misunderstandings must be removed. Some people think that you are just using him to do work for you, so more communication is needed." (Director of Department of Medical Administration, SPHCC)	**More communication**	"When communicating with others, keep a low profile. Win-win cooperation is a two-way process, so we must cooperate with each other and respect each other." (President of Medical Department of SPHCC)

4.3.5 Analysis of the advantageous resources of hospitals

In the interview, the researcher learned about the advantageous resources of each infectious disease hospitals mainly from "medical level, scientific research capabilities, hospital scale, advantageous disciplines, financial subsidies, core departments, public hospital policy support, hospital culture, hospital brand, and hospital geographic location". The NVivo 12 software was used to conduct statistical analysis, and the results are shown in Figure 4-9 and Table 4-7.

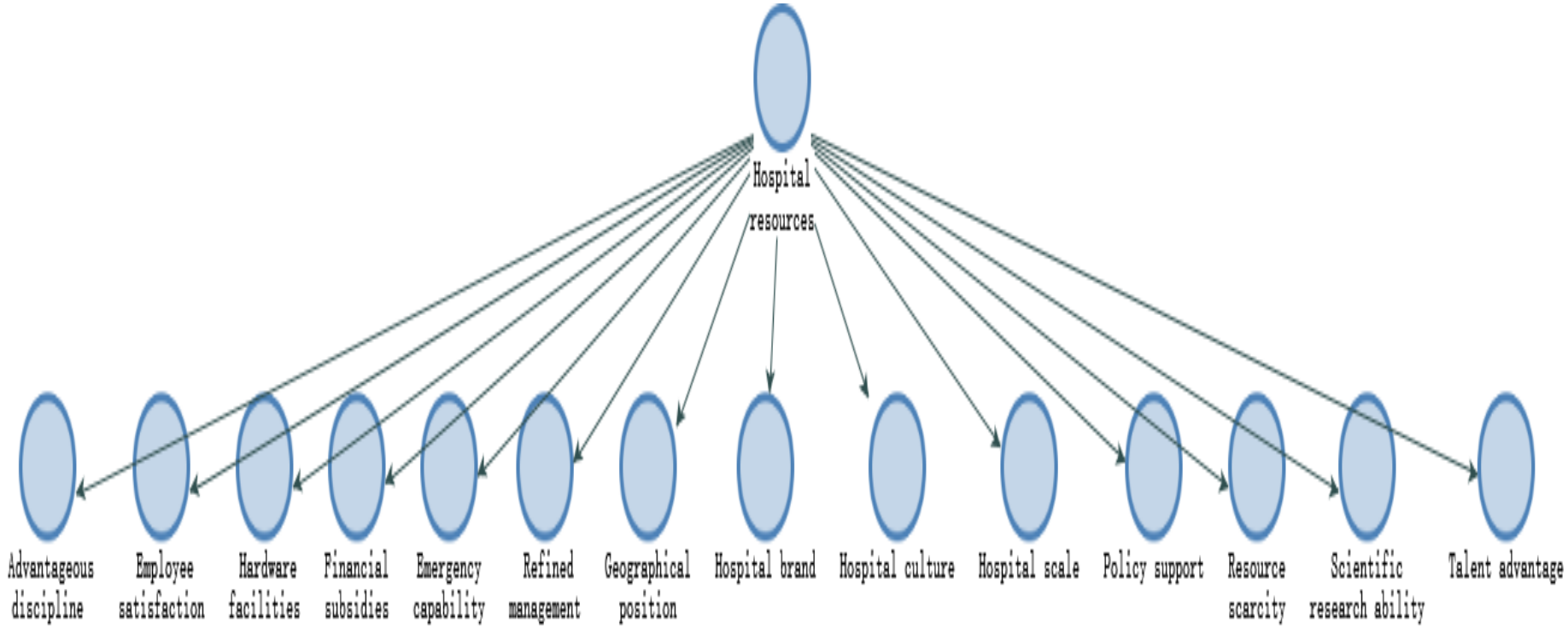

Figure 4-9 Reference dimensions of hospital resources

Table 4-7 Examples of advantageous resources possessed by hospitals for infectious disease

Hospital resources	Examples
Advantageous disciplines	"Our hospital has been focusing on the clinical diagnosis and treatment center of infectious diseases, mainly specializing in infectious diseases and elderly care. The core department is a diagnosis and treatment center combining hepatology and pulmonology with infectious diseases, and is a designated lung hospital in the region." (Vice President of SFDGH) "Liver diseases and traditional Chinese medicine are our advantageous disciplines." (Deputy Secretary of SPNAIDH) "We have advantage in infectious disease discipline, such as surgical treatment of tuberculosis and acquired immune deficiency syndrome (AIDS). We are able to conduct an operation on any part of the body, from head to toe, and no domestic hospitals have such advantage." (Vice President of SPHCC) "Our hospital is influential in liver disease in Shanghai, and takes the lead nationwide in the basic research and clinical research and treatment of AIDS." (President of SPHCC) "Hepatology, tuberculosis, respiratory medicine, tumor, and invasive technology are our advantages. Our treatment of liver disease is the best in the local area, and the treatment of tuberculosis ranks well across the country." (Vice President of WFPH) "The specialties of our hospital are mainly reflected in the traditional liver disease, tuberculosis, and AIDS. The diagnosis and treatment of other infectious diseases is undoubtedly an advantage of us. The artificial liver and hemopurification level of our hospital are competitive in the city. In addition, we are the best in the diagnosis of pathogen microbiology of infectious disease in the city. The provincial key discipline is infectious diseases, and integrated traditional Chinese medicine and western medicine, and the municipal key disciplines are the liver diseases, tuberculosis, and clinical laboratory." (Vice President of WFPH) "Advantageous disciplines are tumor, liver disease, and lung disease. As the only tumor hospital in the city, we are the earliest hospital to conduct tumor radiotherapy and surgical treatment in the city, and a system from tumor screening to treatment is formed." (Vice President of YSPH) "We are relatively competitive in tuberculosis and liver disease, strong in general medicine, and have advantage in oncology and the radiotherapy." (Vice President of YSPH) "We are strong in the diagnosis and treatment of tuberculosis and AIDS, and have two key discipline construction projects of researches in infectious diseases in Chongqing and traditional Chinese medicine on infectious diseases." (President of CPHMC) "The key departments are AIDS and tuberculosis." (Vice President of ZFPH) "The core department is liver disease" (Vice President of HSPH) "Our geographical location is extremely good as it is located at the city center. It is because of its convenient location that the elder care ward is so prosperous in our hospital. Daughters and sons, and other family members place the elderly in our hospital and visit them every day. The hospital is superior to nursing homes since it can provide medical services." (Vice President of SFDGH) "The convenient location is our advantage as our hospital is situated at city center." (President of HSPH) "Our hospital is located at the rural area, very close to the airport. It is the designated hospital of a port, which is the advantage of our hospital." (Deputy Secretary of SPNAIDH)

Hospital resources	Examples
Geographical location	"As for its geographical location, it is close to the port, 3 kilometers from the subway, and 8 kilometers from Disneyland Park." (Vice President of SPNAIDH)
	"In terms of geographic location, commuting is inconvenient and transportation cost is high. But this will have weaker effect as the urban development will cushion its impact." (Vice President of SPHCC)
	"Geographical location should not be an obstacle. As long as we have specialties, patients from the Yangtze River Delta and across the country will come. The recent years has witnessed the significant increase in the number of outpatients and in-patients. With unique expertise, hospitals can be attractive to patients and talents." (Vice President of SPHCC)
	"We have an advantage in the geographical location. It is very good for an infectious disease hospital to locate at the city center, which is also the envy of other hospitals when visiting our hospital. It is a 5-minute drive from the city center and a 5-10-minute drive from the train station. The geographical location is what we are proud of." (Vice President of WFPH)
	"Situated at the center of the city, the New WFPH enjoys a convenient location adjacent to the east area of Wuxi. There are no large public hospitals around, so the hospital has a great room for development." (Vice President of WFPH)
	"The hospital is situated at the city center. It seems okay now, but it is better to build the new hospital in a relatively remote area in the future." (President of YSPH)
	"The geographical location can be both advantageous and disadvantageous. The advantage is that it is next to the Geleshan National Forest Park, and the air is very good, making it very suitable for recovery. However, the inconvenient transportation makes it difficult to access." (Vice President of CPHMC)
	"Although the hospital is located at a faraway place, it is not a disadvantage as the hospital is close to the airport and the building of municipal government. From the perspective of centralized treatment of COVID-19 patients, the geographical location becomes an advantage, because there are not many residents around, which can play an important role in the prevention and containment of the epidemic and the isolation of people." (Vice President of ZFPH)
Hospital scale	"As for the scale, our hospital is the largest among the existing hospitals for infectious disease. We have 340 beds, and the total number of employees is more than 200." (Vice President of SFDGH)
	"At present, our hospital has 100 beds." (Deputy Secretary of SPNAIDH)
	"The scale of the hospital is relatively small at present. There are about 1000-1200 beds, which is the most suitable number, and the ideal situation is that half of them are occupied by the department of infectious diseases." (Vice President of SPHCC)
	"The hospital covers an area of 230 mu (about 38 acres), which has been greatly improved. The hospital is not bad in its land area compared with hospitals for infectious diseases in the prefecture-level cities of China. There were 500 beds before, but now the new hospital has 600 beds. Once the Wuxi Second People's Hospital moves away, there will be another 880 beds. So, the final number of beds is 1500." (Vice President of WFPH)
	"The hospital covers an area of about 38.8 mu (nearly 6 acres), with a total construction area of about 32,000 square meters. There are 550 approved beds and 436 available beds." (Chief of Department of Medical Education, YSPH)

Hospital resources	Examples
Financial subsidies	"The size of the hospital will reach 200,000 square meters when the clinical center is built after the epidemic. This size is not small in the city." (President of YSPH)
	"There are 800 beds in the two campuses of our hospital, among which the general campus has 260 beds. "During the COVID-19 epidemic, the government invested 1.75 billion yuan and allocated 550 mu (about 91 acres) of land to build a new emergency hospital for infectious diseases. The newly built hospital has more than 500 fixed beds and can hold 2500 beds. There are 200 beds as temporary reserves." (Vice President of CPHMC)
	"Our hospital has integrated three hospitals, and it is hoped to be built as the most beautiful garden-style hospital in Zunyi." (Deputy Secretary of ZFPH)
	"Financial subsidies are large.Although Fengxian district is underdeveloped, the financial subsidies reach more than 27 million yuan a year. The construction of the hospital completely relies on the funds that are embarked for it, and I am grateful to the government for its support." (Vice President of SFDGH)
	"Financial subsidies are far from sufficient. Although it reaches about 45%, the hospital is still in debt and the subsidies can only guarantees the personnel's salary at best. The income from medical services, which is 70 million yuan a year, is not enough and can only cover the daily expenses as there is no other source of income." (Vice President of HSPH)
	"Financial support is about 30-40 million yuan, and financial compensation accounts for 40% of the business income." (Vice President of SPNAIDH)
	"We have an advantage in the degree of financial subsidies. In general, for Grade III hospitals, financial subsidy accounts for 9.6% of their financial revenue, and the municipal hospitals' financial compensation last year took up 7.8% of the total revenue. As a special hospital with public health functions, our hospital's financial compensation reaches 30%. Such high financial support is a great advantage for us." (Chief Accountant of SPHCC)
	"Financial support is 100 million yuan, which is not very sufficient, but it is acceptable." (Vice President of WFPH)
	"The government is paying more attention to financial subsidies. It used to be inadequate, but has become better recently. Compared with general hospitals, the government gives preference to us. The full-pay authorized personnel posts increase by 151 and personnel funding reaches about 18 million yuan, which are unprecedented. In the past, per capita subsidy was 10,000 yuan, but now it has increased to 120,000 yuan." (Vice President of YSPH)
	"Financial subsidies are still far from the real needs. There are financial subsidies (not including bonuses) for the fixed salary of permanent staff. Our hospital has about 1030 employees. There are only about 440 permanent staff, and the remaining has no financial subsidies at all. Due of the COVID-19 epidemic, the government subsidies this year are relatively greater, but it has not met expectations, because of the weak economic foundation of our hospital." (Vice President of CPHMC)
	"As for advantageous resources of our hospital, financial subsidies come first. There are relatively few units that are fully funded by the government, but our hospital is one of them." (Vice President of ZFPH)
	"In terms of hospital culture, I think our hospital is a leader in the Fengxian district. We have a moral education base themed as 'aesthetic education in Guhua area', which is a five-star education base. There is also a Party building league, led jointly by schools, medical institutions, and parks. With the elderly ward as the moral education base, more than 3,000 people from the society come to serve each

Hospital resources	Examples
	year." (Member of the Party Committee, SFDGH)
	"Guhua area occupies one quarter of Nanqiao Town which is the political, economic, and cultural center of Fengxian district, so Guhua Hospital can be considered as Fengxian Hospital. Starting from the culture of Fengxian district, we put forward the hospital culture of aesthetic education in Guhua area." (Vice President of SFDGH)
	"The staffs in our hospital show the greatest dedication. Only medical staff in hospitals for infectious disease can really understand that doctors face life threats like soldiers. All staff do not care about personal gains and losses, and what they do are all for the benefit of the hospital and the country. Our staff's ideological consciousness is very high." (Vice President of SPHCC)
	"The unique hospital culture of hospitals for infectious disease is also a core competence, which is the biggest difference compared with other hospitals. Hospitals for infectious disease must demonstrate their contribution to Shanghai by treating infectious diseases when public health emergencies occur. Life-saving actions can better reflect the cultural atmosphere of humanitarianism. Braving hardships is an indispensable spiritual quality for employees working in the field of infectious diseases." (Deputy Secretary of SPHCC)
Hospital culture	"Hospital culture is indispensable, and the hospital culture of the WFPH should be amplified. The culture of hospitals for infectious disease is very essential. We must have a sense of pride, and cultural confidence, and self-reliance. Culture is very important, and I attach great importance to Party building and hospital culture. Our hospital has done well in culture and history walls, and Party building." (President of WFPH)
	"Great improvement has been made in the external image of our hospital. In the past, much had been done, but little attention had been paid to the publicity. Now the publicity culture has been greatly improved. In addition, our hospital has established the Red Ribbon Care Center, which has won many honors, and the micro film has also been selected for the national competition. The government has also made it a bright spot." (Vice President of WFPH)
	"In recent years, our hospital has continued to carry out various activities of public interests, showing the image of the hospital, and winning the trust of the people. Meanwhile, it also promotes the business of the hospital, which makes the social and economic benefits of the hospital get greatly improved." (Chief of Department of Medical Education, YSPH)
	"At present, our hospital is gradually creating coherent and systematic culture. The core values and the cultural brand series of the hospital are gradually taking shape." (President of CPHMC)
	"Our hospital values the construction of hospital culture. The culture is mainly related to the geographical location of the greater Chongqing. Our hospital is located at Hongyan revolutionary education base and inherits the Hongyan spirit. We have the hospital motto, hospital tree, hospital flower, and hospital songs. The hospital culture is very encouraging." (Deputy Secretary of CPHMC)
	"As long as the government gives an order, we will implement it strictly. This is highlighted in this COVID-19 epidemic. In the face of the outbreak, everyone knows what professional qualities and professional ethics we should have. The staffs of hospitals for infectious disease are better positioned than those in other general hospitals to deal with public health issues." (Vice President of ZFPH)
Hospital brand	"The medical level of our hospital is among the best at the county or Shanghai district level." (Vice President of SFDGH)

Hospital resources	Examples
	"We think our hospital has a long history, and enjoys a household name in the city. Patients with diseases related to the hospital may still come here." (President of HSPH)
	"It is recognized in Chuansha area, including the original Pudong area." (Deputy Secretary of Shanghai Pudong New Area Infectious Diseases Hospital)
	"In the field of infectious diseases, the reputation of our hospital in patients and the expertise of the discipline of infectious disease are generally acceptable. The brand of "Public Health Clinical Center" has also been recognized by people. The public health emergency happened this year has made everyone see a different public health center, which shows a different image from the old hospital for infectious diseases. This is a very good resource." (Deputy Secretary of SPHCC)
	"Our hospital is the only Grade-A Tertiary hospital for infectious disease in Shanghai, with a history of 106 years, because infectious diseases are the most common disease in history." (President of SPHCC)
	"Our strength in liver disease is the greatest among local hospitals, and strength in tuberculosis also ranks well nationwide." (President of WFPH)
	"We are somewhat influential in infectious diseases, medical oncology and radiotherapy in the local area, and residents here recognize the brand of our hospital." (President of YSPH)
	"Our brand advantage is distinct. When it comes to infectious diseases, the residents will first consider us. We have a reputation in the local area. When they have infectious diseases, they first consider our doctors. This is a brand advantage." (Vice President of YSPH)
	"We have certain influences over several nearby provinces. About 30% of tuberculosis and AIDS patients come from surrounding districts and counties. Our treatment effect, service, environment and other aspects are spread by word of mouth, so that we can gain more trust from patients." (President of CPHMC)
	"The district health commission provides our hospital with great support, from leveraging the medical treatment alliances to various activities of the infectious disease hospital. In terms of authorized post and remuneration, our hospital is not bad." (Vice President of Fenghua District Guhua Hospital)
	"I won the support of a fiscal policy on medical insurance at the end of 2019. For the infectious disease patients who come to our hospital, there is no deductible line for insurance, and the reimbursement rate is increased by 5 percentage points. An in-patient for hepatitis can save about 1,500 yuan. For the group of hospitalized people who have hepatitis and are not very affluent, saving over 1000 RMB a time sounds attractive." (President of HSPH)
Policy support	"Hospitals for infectious disease cannot be evaluated based on business volume and require financial support. If talents and diagnosis and treatment capabilities need to be adjusted in the future, government support is required." (Vice President of Shanghai Pudong New Area Infectious Disease Hospital)
	"In terms of policy support for hospitals for infectious disease, evert time when an epidemic ended, the policy support was the greatest. Over time, the support diminishes. Therefore, when the policy support is strong, it is necessary to think about the future sustainable development strategy." (Vice President of SPHCC)
	"The government has rebuilt a public health center with more than 70,000 square meters and 500 beds. In recent years, the government support has enhanced, and there will be more advantageous resources in the future." (Vice President of YSPH)

Hospital resources	Examples
	"There is some policy support, such as funds, equipment, policy support, personnel funds, and fund investment in infrastructure construction." (President of YSPH)
	"At present, the government pays more attention to it and invests more. Our hardware facilities, precautions, and investment should be based on that of hospitals in Shanghai." (Vice President of ZFPH)
	"As for scientific research capabilities, we strive for 2-3 projects in the district each year." (Vice President of SFDGH)
	"Although staffs in our hospital are not many, the scientific researchers have improved our strength in scientific research. We have some projects of the municipal health commission and the district committee of science and technology." (Vice President of SPNAIDH)
	"Our hospital's scientific research strength has reached a height that cannot be achieved by ordinary hospitals. Our hospital is people-oriented, so people who are willing to work will have many opportunities. There are also good scientific research incentive policies." (Director of Department of Medical Administration, SPHCC)
Strength in scientific research	"Our hospital has more than 200 doctors, 500 nurses, and over 150 scientific researchers. The ratio of clinical personnel to scientific researcher is 2:1. We are the hospital with the highest proportion of scientific researcher in China. The conversion rate of scientific researches is the highlight as the revenue from conversion ranks first among all hospitals in China. As a public health bastion, we must have very strong scientific research capabilities. The scientific research conditions are very complete. Our animal facilities serve more than 170 units across China, and the P3 laboratory has the most days of operation in the country. The supercomputing platform ranks the top in medical system, and the pathogenic microorganism research platform is also our strong point." (President of SPHCC)
	"Our scientific research capability is not comparable to general hospitals, but it has been greatly improved compared with 13 years ago when we did not have such capability. In terms of awards, it used to be almost impossible for us to win an award, but we have won a provincial award in recent years." (Vice President of WFPH)
	"There are more than 100 people in scientific research team, including 10 doctors and over 60 masters. Besides, we have one staff rated as leading figure in innovation in Chongqing city and three staffs rated as middle-aged and young medical high-end talent in Chongqing. Under the leadership of the academic leaders, we have achieved fruitful scientific research results. "(Vice President of CPHMC)
	"We are the only infectious disease hospital in Fengxian District, and also a designated hospital for tuberculosis. There is no competition from other hospitals." (Member of Party Committee, SFDGH)
The rarity of resources	The recent years has witnessed the significant increase in the number of outpatients and in-patients. With unique expertise, hospitals can be attractive to patients and talents." (Vice President of SPHCC)
	"We are responsible for the treatment of various infectious diseases as a designated hospital. Our hospital is the designated hospital for AIDS and multi-drug-resistant tuberculosis infectious diseases, and is also the only oncology specialized hospital in the city." (Chief of Department of Medical Education, YSPH)
	"Our hospital is the only Grade III infectious disease hospital in Chongqing, serving patients in the entire Chongqing and surrounding provinces. Our main

Hospital resources	Examples
	advantage is that there are many patients, especially those with severe tuberculosis and AIDS. The medical level of infectious diseases treatment is the highest in the covered area." (Vice President of CPHMC)
	"During this epidemic, the first batch of 5 medical staffs was sent to support Hubei. There is a place for Guhua Hospital in the war against the epidemic. Next, we will send staff to Shanghai Pudong International Airport for assistance. The ability to respond to emergencies is based on our own professional capabilities. Those having been in the frontline should play a role." (Member of Party Committee, SFDGH)
	"Our hospital is a designated medical institution for infectious diseases at the frontier ports, and is also a designated hospital for guaranteeing large conferences. We also have a place in the treatment of H1N1t and H7N9 emergency." (Vice President of SPNAIDH)
	"What stands out in our medical level is the emergency response capability. It can be seen from the COVID-19 epidemic that emergency response capability cannot appear suddenly, but is the result of long-term accumulation and training of emergency treatment ability. Our hospital is in a position to undertake such a large-scale emergency task. Our advantageous resource is reflected in the war against the epidemic and is able to be put into use at both peacetime and wartime." (Chief Accountant of SPHCC)
Emergency response capability	"Advantageous resources have formed a system through emergency management. An essential task of hospitals for infectious disease is to respond to public health emergencies. At present, our hospital has complete disciplines, and sufficient resources in the diagnosis and treatment of infectious diseases. Doctors specializing in general medicine have been trained in infection containment." (Vice President of SPHCC)
	"We have more than 60 patients in our hospital. Only two are in a critical condition, and five or six are heavily ill. Together, there are only seven or eight patients having relatively serious illness. But all the basic work, fever clinics, and basic treatments are still done by hospitals for infectious disease." (Vice President of WFPH)
	"In the face of new and suddenly appeared infectious diseases and other infectious diseases, hospitals for infectious disease are better poised to deal with it calmly. The infectious disease wards can meet the needs of infectious disease treatment. Medical staffs have a stronger awareness in infection containment and are more professional. Infectious disease patients are brought together to receive treatment, so there is a large size of samples, which is helpful for scientific research." (Vice President of CPHMC)
	"Our hospital is more experienced in dealing with public health emergencies than other general hospitals in terms of management and operation." (Deputy Secretary of ZFPH)
	"Talent advantage is our advantageous resource. Our strength in medical technology is relative greater among similar hospitals at the same level. Three people have the professional title of professor and nearly 20 people have the professional title of associate professor, which is definitely rare to see in Grade II hospitals for infectious disease." (Member of Party Committee, SFDGH)
Talent advantage	"There are four masters and one doctor in the traditional Chinese medicine team. Assuming that there are 12 clinicians, the proportion of people with high education degree is still relatively high." (Vice President of SPNAIDH)
	"Hospitals should pay attention to disciplines and talents. The two levers of professional title promotion and performance distribution only have played a minor role so far, and though we have been encouraging them, little effects have

Hospital resources	Examples
	been delivered." (Vice President of SPHCC)
Hardware facilities	"87 people in our hospital have senior professional titles, and six people were selected for the '111 Project' of the city. Several staffs serve as the chairman and deputy chairman of committee of the provincial and municipal branches of medical academies." (President of YSPH) "The hardware facilities of our hospital are relatively complete, the conditions of wards are relatively good, and the number of negative pressure wards is large enough in China. The equipment in all wards and the architectural layout can ensure the spatial isolation between doctors and patients so as to safeguard the safety of medical personnel. In an attempt to make more innovations to promote the development of the hospital, many research platforms have been established." (President of SPHCC) "The hospital is fully equipped with medical equipment, and has 187 advanced diagnosis and treatment devices at a cost of over 10,000 RMB per device, including a medical linear accelerator, nuclear magnetic resonance, and spiral computed tomography (CT)." (Vice President of YSPH)
Refined management	"Due to the high proportion of fiscal revenue, our hospital has the highest requirements on budget management in comparison with all municipal hospitals, and hence has the advantage of budget management. Our hospital is a model hospital for comprehensive budget management among all municipal hospitals. Budget management runs through all the economic operation activities, which are in line with the hospital strategy. Another advantageous resource is good internal control. The hospital is also prominent in the informatization construction of internal control, which is a result of advantage in cost control. If the business income is relatively low, it is more necessary to enhance internal control." (Chief Accountant of SPHCC) "We have a good reputation in quality management." (President of WFPH)
Staff satisfaction	"Our hospital has a high happiness index. We live and work in peace and contentment in Fengxian district. 90% of the medical staff are locals who lead happy lives without worrying about food and clothing." (Vice President of SFDGH) "It is worthwhile to work at our hospital. The intensity of work is not great, but the performance as well as salary and welfare of employees are not bad." (Director of Administrative Office, SFDGH)

4.3.6 DC of hospitals for infectious diseases

According to the continuous changes in the general environment, taking this COVID-19 as an example, the dynamic adjustment measures have been made by the hospitals' advantageous resources (Table 4-8).

Table 4-8 Examples of dynamic capabilities

Dynamic capability	Examples
Emergency response capability	"DC require that you have excellent professional ability and the ability to cope with various emergencies." (Member of Party Committee, SFDGH) "A doctor of cardiology medicine who was brought into our hospital established the department of general medicine, which, in my eyes, has contributed to our fight against the epidemic. I set up the department of surgery. There was a pregnant woman who was a confirmed case of the COVID-19. Although our hospital has no obstetrician, a doctor from an obstetrics and gynecology hospital came to our hospital for surgery, which also relieved a lot of pressure on the society." (President of HSPH) "In addition to doing a good job in traditional projects in the field of infectious diseases, new projects must be developed. The right response to the newly-discovered infectious disease epidemic and the handling of it are a manifestation of core competence." (President of Medical Administration Department, SPHCC) "Hospitals for infectious disease must have the ability to respond and adjust to suddenly appeared infectious diseases in a timely manner. This is an important indicator that can reflect the ability of hospitals for infectious disease and their management level." (Vice President of SPHCC) "Hospitals for infectious disease lack real core competence, which can be seen in the actual treatment of COVID-19. Of all the patients infected with COVID-19, only two were in a critical condition, and they needed extracorporeal membrane oxygenation (ECMO). However, we do not have the technical strength and lack the ability to cure patients that are heavily ill." (Vice President of WFPH) "The newly constructed public health emergency center has the ability to cope with the rapid changes in the prevention and treatment of major diseases, especially infectious diseases. Attention has been given to both the health emergencies and daily medical care, and the clinical diagnosis and treatment are combined with scientific research and teaching." (Vice President of YSPH) "The COVID-19 epidemic exposed the deficiencies in emergency response system. Therefore, it is necessary to expand the scale of our hospital and establish an emergency hospital of CPHMC to deal with public health emergencies." (Vice President of CPHMC) "During the epidemic, patients were brought together in hospitals for infectious disease to receive treatment. This is a great advantage for us, and we need to make dynamical adjustment according to the national policy." (Member of Party Committee, ZFPH) "There are more than 200 beds for the elderly care in our hospital. Making the elderly care larger in scale and better in quality is also a manifestation of DC. Now the number of beds in the department of infectious disease is reduced from 100 to 60, and the rest of medical resources are all used for the elderly care beds. This is dynamic adjustment." (Vice President of SFDGH) "In the emergency response to COVID-19, the hospital was also constantly adjusting internally, beginning with doctors of internal medicine and infectious disease. With the development of the epidemic, when the number of patients gradually increased, internists needed to go to wards to participate in the treatment, and surgeons who had been at the periphery of the wards before entered the ward. Dynamic adjustments have also been made in

Dynamic capability	Examples
Resource allocation capability	the administrative department. As many departments were very busy, relatively idle personnel were quickly transferred to a busy position to enable the hospital to adapt to changes in the hospital. Material and equipment should also be reallocated according to the needs of the epidemic." (Vice President of SPHCC)
	"The construction of operation room and public health infrastructure, adjustment of beds, staff training, how to make best use of the strength of the whole hospital, ward building, rest area of medical staff, and material security, all of them need to be considered with the mind of dynamic adjustment. This is the direction of future development." (Vice President of WFPH)
	"During the COVID-19 epidemic, the Center actively responded to the decisions in fighting against the epidemic made by the municipal party committee and government, formulated plans, arranged the staff, and transformed wards, successfully achieving the goal of 'zero death of patients and zero infection of medical staff'." (Vice President of CPHMC)
	"It is recommended to build an expert database at the national level. During the COVID-19 epidemic, many medical staffs in the general hospitals in Wuhan were infected, so patients with infectious diseases must go to specialized hospitals for treatment to avoid cross-infection in hospitals. Infectious diseases require macro-level deployment of the government, and patients with infectious diseases should be admitted to hospitals for infectious diseases." (Vice President of ZFPH)
	"Instead of being extensively strategic, we should have an overall strategic map and detail it into various strategic targets." (Chief Accountant of SPHCC)
Decision-making capability	"DC involve all aspects of a hospital and whether the decision-making is right or not is the most important indicator of DC. The management ability reflects a hospital's DC and it will become a significant indicator of whether a hospital for infectious diseases is good or not and whether it is a first-class hospital or not." (Vice President of SPHCC)
	"Our hospital proposed a slogan, 'To make a big change every five years and to make a small change every year'. A small goal of common consensus is formed every year, integrating the environment, talents, disciplines, hardware, services, the culture, and the hospital's goals and visions into it." (Vice President of CPHMC)
	"Good strategic thinking, to a certain extent, can better reflect the core competence of a hospital." (Vice President of SPHCC)
Strategic thinking	"I grasped the concept of DC for the first time. My understanding is to 'measure the situation and adjust actions so as to make the situation develop in a favorable direction'. In face of the environment changes, adjusting strategy accordingly is essential." (Vice President of SFDGH)
	"The strategy proposed by the President is very important. Timely adjustment of the strategy is a prerequisite for survival. Otherwise, a hospital can hardly survive. When I took office in 2018, I saw the plight of this hospital. I feel that no matter how long will I work here, at least I have to help the hospital identify a clear direction of development." (President of HSPH)
Active learning	"We need to learn from others regularly and follow up constantly. The management mode of the Grade II hospital is relatively backward in many aspects. I feel that I have benefited a lot from each lecture. I hope that training courses will be held to improve the ability of middle-level cadres." (Vice President of SFDGH)

Dynamic capability	Examples
	"Professionalism is reflected in continuous learning and communication with domestic and international experts. You must go out because you cannot build a car behind closed doors." (Vice President of HSPH)
	"First, leadership and middle-level cadres must change their thinking. Leaders and medical staff in hospitals for infectious disease will take action only if they learn new theories." (Vice President of SPHCC)
	"Hospitals should adjust themselves to the bigger picture of epidemic, and be in line with the concerns of financial department and the nation. Much more effort should be made to prevent and control infectious diseases." (President of YSPH)
	"We should waste no crisis and seize opportunities to bolster areas of weakness. The municipal government attaches great importance to it and has issued a series of policies to support the development of public health. Hospitals in Shanghai have no worry about finance. Hospitals are developing in a good direction, in which there are crises and opportunities." (President of SPHCC)
Capability to turn adversity into opportunity	"It means more than emergency response, but about how to deal with the hospital's emergencies, address economic difficulties in a dynamic approach, handle a sudden outbreak of epidemic, safeguard public safety and prevent fire accidents. We need to turn adversities into opportunities, which can be treated as DC adjustments." (President of YSPH)
	"A heavy dependence on past experiences can only makes people content with status quo and reluctant to make progress, which is not how DC develop. During the treatment of COVID-19, despite the fact that people are of different minds and the system and mechanism is not implemented smoothly after the integration of hospitals, we have still done a good job in concentrating infected patients, and admitting and treating them." (Deputy Secretary of ZFPH)
	"Without performance, the work will be difficult to carry out. After the five medical staff returned from Hubei where they fought against the epidemic, the hospital held a commendation meeting. The effect was indeed very good. Spiritual encouragement would also make people feel good, as it indicates the leader's affirmation of their achievement." (Vice President of SFDGH)
Performance leverage	"Some disciplines of the hospital are unnoticeable in ordinary time, but they are the specialties of the hospital. Only by giving them the preferential treatment in advantageous resources and performance can they demonstrate strong DC when an epidemic appears. Taking the department of infectious disease as an example, there are not many patients, so the performance is not good. If the priority is given to it as for advantageous resources and performance, the core competence will be improved, and the specialty of the hospital will be guaranteed." (Vice President of SPHCC)
	"The better the employee's incentive mechanism is, the more willing the employee will be to work better. Only in this way can the core competence be enhanced, and all kinds of resources be easier to access. I value performance very much. This year's performance needs to be greatly adjusted to be favorable to those who can get things done and provide support for the core competence of the hospital. Performance is the most fundamental point of strength, but it is also the most core motivation." (President of WFPH)
	"When bringing in new talents, we must fully consider their performance to ensure that they can do practical work at our hospital. For example, our hospital has an expert on liver disease, who can help the department develop

Dynamic capability	Examples
	and create 30 million business income on his own. Thanks to him, the liver disease discipline in our hospital then becomes stronger." (President of CPHMC)
Process reengineering	"In terms of the project research on the humane environment of the hospital, we plan to let the heads of each department find a way to improve the diagnosis and treatment process services. It is not a requirement imposed on them, but their own application, so the effect will be better." (Vice President of SFDGH)
	"Take advantage of the opportunity of emergency work to train staff. When the informatization construction reaches a higher level and the smart hospital is realized at a certain degree, remote services will be launched." (Vice President of CPHMC)

Through the interview, we also analyzed the core capabilities of the hospital for infectious diseases, as shown in the Table 4-9.

Table 4-9 Examples of core competences

Core competences	Examples
Scientific research level	"Although staffs in our hospital are not many, we perform well in subject researches. Our hospital has cultivated some scientific research talents, so we have gained more projects from the municipal health commission and the district committee of science and technology." (Vice President of SPNAIDH)
	"In the past two years, we have invested a lot in scientific research, and the conversion rate of scientific research is also ahead in China." (Chief Accountant of SPHCC)
	"The core competence of hospitals for infectious disease lies in the early detection and diagnosis of unknown pathogens." (Vice President of SPHCC)
	"As a public health bastion, we must have very strong scientific research capabilities. We have a very sophisticated scientific research platform, and a top global scientific research team with united hearts and minds. The conversion rate of scientific researches is the highlight as the revenue from conversion ranks first among all hospitals in China." (President of SPHCC)
	"Our scientific research capability is not comparable to general hospitals, but has been greatly improved. There have also been breakthroughs in national-level projects, and scientific and technological achievement awards." (Vice President of WFPH)
	"Previously, there was no full-time research staff, but now we have specially set up a scientific research laboratory to adjust scientific research as the first productive force. Scientific researches hold sway in the core competence of infectious diseases. Our hospital has been recruiting talents since 2016 and there are more than 40 full-time scientific research personnel." (President of CPHMC)
Medical specialties	"In terms of medical specialties, liver disease, AIDS and tuberculosis are the core competence of medical treatment." (Chief Accountant of SPHCC)
	"I think the ability to treat infectious diseases is our core competence. A hospital is impossible to survive without the ability to treat people and a relatively high medical level, as well as technology strength." (Vice President of WFPH)
Disciplines	"At present, we are the best in infectious diseases and the elderly care in Fengxian District. Our hospital does not aim to build high-end physical

	examination business but professional business, such as health monitoring of occupational disease. Because of the high requirements, other hospitals are in no position to do it, and only our hospital is qualified." (Vice President of SFDGH)
	"The core competence of hospitals for infectious disease is reflected in the ability of infectious disease treatment." (President of HSPH)
	"The construction of the hospital's core competence must focus on disciplines, and be led by disciplines leaders." (Vice President of SPHCC)
Talents	"Cultivating our own talents is the core competence." (Director of Department of Administration, SPHCC)
	"For hospitals, core competence is talent." (Vice President of WFPH)
	"There is one leading figure in innovation in Chongqing, two visiting scholars in 'Western Light', and three people rated as middle-aged and young medical high-end talent in Chongqing. Under the leadership of academic leaders in various disciplines, the Center has achieved fruitful scientific research results." (Vice President of CPHMC)
Management	"In terms of medical education and research, our budget management and cost control are also relatively advanced in all municipal hospitals, and we have done well in such aspects." (Chief Accountant of SPHCC)
	"The core competence of hospitals for infectious disease should be particularly reflected in hospital management, the technical and academic advantages of specific disciplines (such as early warning, prevention and control, and laboratory diagnosis of infectious disease), and the construction of infectious disease network systems." (Director of Administrative Office, WFPH)
	"Only by linking the performance of the hospital with the overall strategic adjustment of the hospital and medical performance, can the overall competence of the hospital be enhanced." (Vice President of SPHCC)
Hospital culture	"Unique hospital culture is one of our core competences, which is the biggest difference compared with other hospitals." (Deputy Secretary of SPHCC)
	"The culture of hospitals for infectious disease is very essential. We must have a sense of pride and have cultural confidence and self-reliance. Culture is very important, and I attach great importance to Party building and hospital culture. Our hospital has done well in culture and history walls, and Party building." (President of WFPH)

4.3.7 Inspiration of COVID-19 emergency treatment

Through analyzing the qualitative interview information of the above 8 hospitals for infectious disease, we use the SWOT to analyze the internal factors and external environment of the emergency management capability of treating COVID-19 in China, so as to promote emergency management capability which is the most important indicator to test the DC of Infectious Disease Hospitals (Table 4-10). The SWOT analysis model is the most representative model of the design school in the theory of strategic management, SWOT namely strengths, weaknesses, opportunities, threats. 'S' and 'W' are used to analyze factors within the industry, 'O' and 'T' are used to assess the industry's external environment (Zhen et al., 2018).

(1) Strengths. Infectious disease hospitals have always adhered to the development strategy of " preparing for both peacetime and wartime ", set up infectious disease isolation wards that meet the standards of disinfection and isolation of infectious diseases, and some hospitals also have negative pressure wards. Specialty of infectious disease, the hospital traditional superiority discipline, has the certain influence. The staff of the infectious disease hospital have good professional accomplishment and dedication spirit, and resolutely carry out the instructions from the government and the hospital. In addition, after the several experiences confronting the emerging and re-emerging infectious diseases, the emergency management experience of infectious disease hospitals is relatively rich than that of general hospitals. Above all, the leaders of infectious disease hospital pay more and more attention to scientific research, for example, SPHCC takes 32 hours to develop the complete genome sequences of the novel coronavirus, due to it has the world's top research teams and high-end scientific research platforms, with a strong capability to identify unknown pathogens, research and develop preventive reserve technology.

(2) Weaknesses. The general discipline of infectious disease hospital is weak, and the medical staff of intensive medicine and respiratory specialty are insufficient. Only a few infectious disease hospitals set department of respiratory and intensive medicine department, lack of relevant professional well-known experts and talent echelon accumulation. As the treatment of severe patients increased, the medical staff who can be skilled in the operation of ECMO is significantly inadequate. As a result, only one infectious disease hospital cannot undertake the emergency task of the large-scale clinical treatment of COVID-19.

(3) Opportunities. China highlights the institutional advantages of the national system in confronting the COVID-19 epidemic. Chinese government protect the people's lives and health even at the cost of a short-term economic downturn. Government officials at all levels have visited designated hospitals to supervise the treatment of the epidemic. They actively coordinate and expand the production capability of medical protective materials, establish a precise docking mechanism between supply and demand of medical resources, and ensure that human resources, protective materials, drugs, equipment and facilities arrive in time. Governments at all levels have formulated plans to strengthen the public health emergency system, which means that infectious disease hospitals will have a new round of development opportunities, the above eight hospitals have been approved large-scale new infrastructure projects. During the COVID-19 epidemic, the whole society

formed a joint effort to fight against the epidemic. The designated hospitals received a large number of medical supplies and living materials donated by the society. On the one hand, those donations effectively supplemented emergency supplies, the medical staff fighting in the front line feel the care from the whole society. On the other hand, the hospital brand influence further enhanced.

(4) Threats. With a population of more than 25 million in Shanghai and Chongqing, and based on the scale of the epidemic in Wuhan, there is currently a lack of large emergency medical centers. One designated hospital will face many difficulties response to large-scale public health events, such as patient admission capacity, staff accommodation space, the number of medical staff, medical rescue capacity.

Table 4-10 SWOT matrix of COVID-19 emergency strategies of infectious disease hospital

	Strengths（S）	Weakness（W）
	SO strategy	**WO strategy**
Opportunities (O)	1. Give full play to the specialty advantages of infectious diseases, actively respond to the epidemic situation, and take the initiative to undertake the task of emergency medical treatment entrusted by the government. 2. Strengthen the publicity affairs, report the touching stories in the emergency and highlights of medical treatment, so as to quickly enhance the influence of hospital brand. 3. Give full play to the advantages of scientific research to carry out pathogen identification, drug and vaccine development, virus trace research.	1. Organize a headquarters of medical treatment at the municipal level to enhance the capability of integrated emergency coordination. 2. Deploy the municipal level's elites to form a municipal expert group to guide the clinical treatment. 3. For severe cases, a team of intensive medical experts and nursing teams from municipal hospitals are deployed into the infectious disease hospital.
	ST strategy	**WT strategy**
Threats (T)	1. Give play to the strength of the professional team and quickly carry out scientific research on COVID-19. 2. Strengthen the construction of hospital infrastructure and prepare space and technical reserves for responding to the larger epidemic. 3. Construct 5G intelligent medical service system to alleviate the shortage of medical staff and avoid nosocomial infection.	1.Improve the emergency management system, strengthen training, improve the emergency management ability of hospital management team. 2. Maintain the stability of the core staff of the emergency, and train the public health emergency management staff, core medical and scientific staff. 3. Promote a group of people with outstanding performance in order to arouse their fighting spirit.

4.4 Strategic development model of hospitals for infectious diseases

In previous parts, the researchers briefly summarized data analysis of the development, resources, and core competitiveness of hospitals for infectious diseases, strategic adjustments of these hospitals, advantages and disadvantages of SAs (medical treatment alliances), countermeasures against the problems, and the elements of DC of hospitals for infectious diseases. The analysis implies several propositions listed as follows:

Proposition 1: Hospitals for infectious diseases with more superior resources are more likely to have competitive advantages.

Proposition 2: Hospitals for infectious diseases with good hospital culture, scientific research ability, talents, and medical features are more likely to have core competence.

According to the RBV, tangible and intangible resources of an enterprise can be transformed into its unique capabilities, and unique resources can hardly be replicated from one enterprise to another. Therefore, these unique resources and capabilities are the source of an enterprise's sustainable competitive advantages (Wernerfelt, 1984). The study adopts the RBV, regards a hospital as an aggregation of resources, and focuses on the characteristics of resources and strategic elements in the market, so as to illustrate the sustainable advantages and differences among different hospitals for infectious diseases.

Tangible resources of hospitals for infectious diseases include the geographical location, the scale, facilities, and financial subsidies. Intangible resources include advantageous disciplines, hospital culture, the hospital brand, and the level of medical treatment, education, research, and management.

In terms of the geographical location, the inductive analysis shows that among eight hospitals, all are located in the urban area or nearby the subway or railway station except SPHCC that is 60 kilometers away from the downtown, the Fourth People's Hospital of Zunyi City that is 45 kilometers away from the downtown, and Geleshan Hospital District of CPHMC that is located on the top of the Mountain. In 2003 when SPHCC was just relocated to the outer suburbs of Shanghai, it was very inconvenient for the staff of the hospital to commute and for patients to see a doctor because the hospital was far from the urban area and had less surrounding transport facilities, which was once a disadvantage of the hospital. However, the impact would diminish with urbanization, and hospitals can attract patients from all over the country as long as they have their own features. On the

other hand, as far as focusing on scientific research is concerned, hospitals located in the suburbs have advantages since they have enough space to build high-level biosafety laboratories, so their disadvantages in the geographical location are now turning into new advantages. Although the Fourth People's Hospital of Zunyi City is far away from the urban area, it is close to the high-speed railway station, which turns its disadvantages into advantages in the admission and treatment of patients with COVID-19.

As for the scale and hardware facilities, SPHCC covers the largest area and has the largest number of negative pressure beds, which highlights its advantages in the scale and hardware facilities in the admission and treatment of patients with COVID-19. The Fourth People's Hospital of Zunyi City and Wuxi Fifth People's Hospital have been relocated, and the scale of them have been expanded. In contrast, Fengxian District Guhua Hospital's and Shanghai Pudong New Area Infectious Diseases Hospital's scale are relatively small, and their hardware facilities are relatively backward, which limits the further development of both hospitals to some extent. After the outbreak of the COVID-19, governments have attached great importance to the construction of public health infrastructure. These eight hospitals for infectious diseases are expected to expand their scale, increase beds, and renew facilities. For example, CPHMC that had received government funding added a construction area of 230,000 square meters and 3,500 beds.

In terms of financial subsidies, seven of eight hospitals for infectious diseases are partially funded by the government and their financial subsidies account for about 20-40% of their revenue. The Fourth People's Hospital of Zunyi City is one of China's few hospitals for infectious diseases that are fully funded by the government. Although hospitals for infectious diseases receive more financial subsidies than other general hospitals, they do not have much earning power and thus sufficient revenue, so their financial subsidies can only guarantee the salary of employees, and some of them are still in debt.

If tangible resources can be supported financially by the government, hospitals for infectious diseases can be built according to the current building model, and these resources can be replicated. Hospital's real advantageous resources should be valuable, not completely replicable, and self-developing. The analysis of intangible resources hospitals own shows that advantageous disciplines of hospitals for infectious diseases are mostly the disciplines of internal medicine (lemology) dominated by liver diseases, tuberculosis, and acquired immune deficiency syndrome (AIDS). Even though some hospitals have

disciplines about surgical diagnosis and treatment of infectious diseases, they have not turned these disciplines into their advantageous disciplines. Advantageous disciplines are the most valuable resources of a hospital, and lemology is an advantageous discipline that enables hospitals for infectious diseases to differentially compete with general hospitals. The function of being the fortress of public health orientated by the government is also the foundation of hospitals for infectious diseases. The transformation of hospitals for infectious diseases should be based on maintaining lemology as their advantageous disciplines and furthering the expansion of comprehensive disciplines to provide better medical treatment for patients with infectious diseases.

As for hospital culture, being dedicated and fearing no sacrifice is a unique and non-replicable advantageous resource and core competence of workers in hospitals for infectious diseases. In the past century, hospitals for infectious diseases have participated in many battles against infectious diseases and left behind many touching stories. The spirit of healing the wounded and rescuing the dying and being fearless of danger and difficulty inherited from the older medical staff of hospitals for infectious diseases has been in the blood of the medical staff. The pressure of facing life-threatening dangers as soldiers is what medical staff actually feel every day. Given the risk of being infected, they are aware of their professional qualities and ethics that they should have in the COVID-19 pandemic. They have an awareness of following commands as soldiers when facing public health events.

In self-development, talents are advantageous resources and the source of a hospital's core competence. The interview shows that leaders of these hospitals have reached a consensus that talents are advantageous resources. It is a common case that a leading talent can support the development of a discipline. For example, the former director of Shanghai Pudong New Area Infectious Diseases Hospital promoted the advancement of the hospital's integrated Chinese and Western medicine and even supported the development of the hospital. Under the leadership of the Secretary of Party Committee of SPHCC, one of China's leading talents in the research on AIDS, the Center occupies a leading position in China in this field. The leaders of CPHMC in charge of scientific research have promoted the rapid development of the Center's scientific research and made fruitful achievements.

To integrate tangible and intangible resources mentioned above, we can take SPHCC as an example. Among all hospitals for infectious diseases in China, this hospital covers

the largest area and has relatively complete equipment and facilities. In addition, the hospital has set up 40 clinic disciplines, ranked among China's top 10 hospitals when it comes to the scientific and technological influence in lemology and boasts a lot of successful experience in emergency response to major epidemics. Therefore, it has certain competitive advantages and ranks among China's best hospitals for infectious diseases. On the contrary, the development of hospitals limited by the scale, hardware facilities, development of disciplines, and human resources will be hindered.

A lot of literature has proved the relationship between the culture and core competence of an enterprise. Hospital culture is a core element of core competence and an important theory in hospital management. The 8 hospitals for infectious diseases interviewed all have their own hospital cultures and unique visions, missions and values, but it does not mean that all cultures can create competitive advantages. Only unique cultures that cannot be replicated and replaced can cultivate core competence with competitive advantages. CPHMC in these cases combines its hospital culture with Hongyan Spirit, a spirit formed in the revolutionary struggle, which is a real reflection of revolutionary predecessors' selfless dedication to the country and the people, and also indispensable spiritual support in the development in the reform and opening-up period. "To fear no sacrifice, be selflessly dedicated, and dare to bear" is a culture shared by all hospitals for infectious diseases. These hospitals are the battlefield, the epidemic is the order, and to prevent and control the epidemic is the responsibility. When an epidemic occurs, workers of hospitals for infectious diseases will be committed to fighting against the epidemic and dedicate their life to protecting the health of the public without hesitation. SPHCC's core values are to be "benevolent, dedicated, innovative and excellent", to build a hospital for infectious diseases that is "world-leading and characterized by infectious diseases", and to have superb "flexibility, comprehensive competence, and research ability". Under the guidance of its hospital culture, SPHCC has had a very clear development strategy, gained remarkable achievements, and become a research hospital driven by scientific research. The number of its researchers has reached 136, half the number of its doctors, which is comparable to that of China's top 10 general hospitals. The building of a scientific research platform and improvement of scientific research ability require a long-term accumulation and the accumulation of talents is especially critical. A hospital's scientific research strength is hard to be caught up with and surpassed by other hospitals' that started later. The combination of clinical medicine and basic medicine will

provide a great scientific and technological support for the diagnosis and treatment of infectious diseases, make the features of hospitals for infectious diseases more distinct, and improve the core competence of these hospitals.

According to VRIO of the RBV put forward by Barney (1995), resources can be transformed into competitive advantages through adjustment of internal organizational structure. The research supports the idea.

Proposition 3: Hospitals for infectious diseases with strong dynamic capabilities are more likely to have competitive advantages.

The RBV mainly emphasizes that what challenge enterprises' internal resources most are their external competitive environment changes, so they must respond to external demands quickly and adjust internal resource allocation timely. The DCT, inheritance, and development of the RBV, gradually came into being and developed rapidly. The DCT emphasizes the capability to change strategic orientation, the capability to make rapid innovation and real-time response, and the reorganization, combination, acquisition, and adaptation of resources and capabilities.

The study analyzes DC of hospitals for infectious diseases from six elements, namely the emergency management capability, the resource allocation capability, hospital performance, the active learning capability, the strategic decision-making capability, the capability to turn adversity into opportunity, and process reengineering.

Emergency management capability. The emergency management capability of hospitals for infectious diseases is one thing the government is most concerned about and a comprehensive reflection of these hospitals' medical treatment. At the beginning of the COVID-19 pandemic, the emergency response preparations were highly uncertain because it is a disease caused by a novel coronavirus that people knew little about. We needed to research and recognize its pathogenicity, transmissibility, and the fatality rate at the initial stage of the pandemic. Therefore, the prevention and control of the pandemic were unpredictable, and a slight relaxation of that would cause greatly influential consequences. At the beginning of an epidemic, the emergency response strategy attaches great importance to the timeliness, which means that key information should be collected as soon as possible, decisions need to be made quickly, protective supplies, negative pressure beds, first aid equipment, the number of medical workers and observation beds should be evaluated dynamically, and emergency response funds need to be reevaluated dynamically. The emergency command of hospitals for infectious diseases should have the capability to

collect and analyze information, to provide early warning and evaluation of an epidemic timely, to organize and mobilize workers efficiently, and to adjust and change quickly. For example, SPHCC, an important part of Shanghai Public Health Medical System, undertakes the arduous task of making the emergency response to public health emergencies and always takes emergency management as a part of its work. SPHCC, as Shanghai's designated hospital for confirmed adults with COVID-19, received active response from all workers, immediately activated the emergency plan, and entered into a state of emergency. It made every effort to the centralized admission and treatment of patients with COVID-19 as well as the prevention and control of the pandemic. On January 20th, 2020, SPHCC admitted its first confirmed patient with COVID-19 and until 24:00 on June 14th, 2020, it had cumulatively admitted 669 confirmed patients with COVID-19, 644 of whom had been discharged from the hospital. Under the unified command of emergency response, the hospital had all work in the preparatory stage done. At the beginning of January 2020, the hospital mobilized all lines and organized special training of emergency response to the infectious disease outbreak. In the middle of January, the hospital activated the emergency response plan, established a leading group and working groups of epidemic prevention and control, and made the full deployment of response to the infectious disease outbreak. In the meanwhile, it prevented and controlled infection in the hospital to ensure that no medical workers would be infected.

The resource allocation capability. Emergency response support especially refers to the preparation and allocation of various emergency response supplies and first aid drugs and equipment. The transfer of patients, disinfection, and other preparations in negative pressure wards and scientific planning for other spare wards should be done. Every effort should be made to complete the construction of emergency reserve buildings and decoration of inpatient areas. Equipment and material supplies should be in place. Equipment of the whole hospital needs to be checked and registered, and available medical equipment should be checked and registered one by one and be ready to be used in emergency wards. As an epidemic continues to develop, electrocardiograph monitors, blood oxygen saturation detectors, ventilators, high-flow oxygen therapy instruments, rescue equipment related to extracorporeal membrane oxygenation (ECMO) and continuous renal replacement therapy (CRRT), need to be purchased urgently to ensure normal medical treatment. Together with the change of an epidemic, the allocation of equipment and material supplies to inpatient buildings should be gradually finished. As the

number of critically ill patients increases and ECMO equipment becomes seriously out of stock, the equipment can be borrowed from other municipal hospitals through emergency coordination. Logistical support, such as the arrangement and moving of material supplies among inpatient areas and observation buildings for medical workers, also reflects the resource allocation capability.

Active learning capability. Given that medicine itself requires our life-long learning, leaders, and middle-level administrators of hospitals for infectious diseases as a vulnerable group should change their thoughts first. Only by continuously learning new theories and advanced management models can leaders and medical workers of these hospitals take action. Professional technicians also need to keep learning, to communicate with those with national or international leading technologies, and not to be secluded from the outside world. Hospitals for infectious diseases themselves also need constant adjustment. They should learn more about the prevention and control of infectious diseases from the country's requirements for medical institutions for infectious diseases in major infectious disease epidemics. Respondents generally believed that academic exchanges, technological cooperation, personnel training and further education among medical treatment alliances are the good ways to learn. Members of these alliances can learn from others' strong points to offset their weaknesses.

Strategic decision-making capability. Strategic decision-making is a dynamic process with high uncertainty and contingency. Hospitals are often forced to adjust their strategies passively due to changes in the overall environment. In the dynamic environment, DC can be improved and intended targets and performance can be reached by collecting information and perceiving, reconstructing strategic decision-making goals, and allocating supportive resources. In the interview, leaders of SPHCC considered that "DC involve all aspects of a hospital and whether the decision-making is right or not is the leading indicator of DC. The management ability reflects a hospital's DC and it will become a significant indicator of whether a hospital for infectious diseases is good or not and is a first-class hospital or not." "Instead of being extensively strategic, we should have an overall strategic map and detail it into various strategic targets. Only in this way can we genuinely reach these targets." "Good strategic thinking, to some extent, better reflects a hospital's core competence." Leaders of CPHMC proposed a slogan, "To make a big change every five years and to make a small change every year." They reach a consensus on a small goal, put forward a development theme, and integrate the environment, talents,

disciplines, hardware, services, the culture, and the hospital's goals and visions into the theme every year. Although many hospital leaders learned the DCT for the first time, their management practice has proven the relationship between strategic decision-making capability and DC.

The capability to turn adversity into opportunity. Laozi, an ancient Chinese sage, once said, "Good fortune follows upon disaster; disaster lurks within good fortune." It means that in the fickle world, good things may go bad and bad things may have their good sides. The COVID-19 pandemic is a catastrophe that has changed the world and had a great impact on the world's politics and economy. Nevertheless, for hospitals for infectious diseases, it is undoubtedly the best opportunity to show their medical treatment ability. As the president of SPHCC put forward, "We need to waste no crisis and seize opportunities to bolster areas of weakness. Hospitals are developing in a good direction, in which there are crises and opportunities." As the president of YSPH proposed, "How can we deal with the hospital's management of emergencies, address economic difficulties in a dynamic approach, handle a sudden outbreak of the epidemic, safeguard public safety and prevent fire accidents? We need to turn adversities into opportunities, which are adjustments made possible by DC." The deputy secretary of The Fourth People's Hospital of Zunyi City suggested, "The development of DC requires us to innovate constantly instead of being heavily dependent on our past experience, content with the status quo, and reluctant to make progress. In the admission and treatment of patients with COVID-19, the secretary of The Fourth People's Hospital of Zunyi City clearly put forward that "we should turn adversity into opportunity. Despite the fact that people are of different minds and the system and mechanism are not implemented smoothly, we have still swiftly adjusted resources, enhanced the capability of emergency management, and done a good job in concentrating infected patients, and admitting and treating them in a short period."

Process reengineering. According to DC Theory, enterprises need to make the constant strategic fit between strategies and organizational structures and between strategies and processes. Process reengineering is the strategic adjustment of enterprises' resources, processes, and business models so as to adapt to the changing environment. Process reengineering and DC are two important parts that complement each other in the enterprises' strategic adjustment, and business process reengineering is the external manifestation of DC. Leaders of Fengxian District Guhua Hospital considered that hospitals at different grades have different management models. Though Secondary

hospitals are inferior to Tertiary hospitals in hardware facilities and talents, they can be comparable to Tertiary hospitals in connotation and management. They can rationalize the process by setting up process upgrade projects, such as to improve a hospital's humanistic environment, to enhance the diagnosis and treatment process and services, and to transform the informationization process. They can give play to the staff's subjective initiative, provide patients with a better experience, and improve patients' satisfaction.

As Teece(2007) pointed out, DC can generate new productive resources by perception (recognize and evaluate opportunities), seizing opportunities (adjust internal and external resources, seize resources, and produce value), and transformation (continuously organization and update). Chen (2017) put forward that the DC development strategy of large public hospitals is keeping an eye on VRIN of intangible resources (the hospital culture and brand), attaching importance to development potential (learning, training, scientific research, and innovation capabilities) and the efficiency of capabilities improvement, as well as enhancing the ability to cope with rapid changes within and outside the healthcare industry by optimizing the process management and resources coordination capability. The study supports this opinion. It takes emergency management, which challenges DC of hospitals for infectious diseases most as an entry point and realizes these hospitals' turning adversity into opportunity from emergency command, resource allocation, active learning, and process reengineering. The study develops research results of predecessors and puts forward the emergency management capability that has been ignored in previous studies of hospitals' DC.

Proposition 4: Hospitals for infectious diseases that adhere to being specialized in infectious diseases and develop comprehensive disciplines are more likely to get rid of the survival predicament as early as possible.

Researchers found that according to the adjustment of development strategy, eight hospitals for infectious diseases interviewed can be divided into several categories as follows: firstly, hospitals for infectious diseases represented by SPHCC and CPHMC, which made the transition early and kept expanding comprehensive disciplines on the basis of focusing on internal medicine of infectious diseases, have developed rapidly and freed themselves from survival predicament in the recent decade and more. The whole SPHCC was relocated after the outbreak of severe acute respiratory syndrome (SARS) in 2003. Adjustment to the hospital's strategy has been made constantly and it can be divided into the following several stages. In the first stage, the Center, as a hospital for infectious

diseases, mainly tried to figure out how to run a hospital for infectious diseases with distinct characteristics in early days of its relocation to the outer suburbs. In the treatment of SARS, it realized its weak comprehensive capabilities, especially in internal medicine and surgery. At the beginning of the operation, the hospital's leaders were thinking about appropriately strengthening the hospital's comprehensive capabilities. Based on the thought, the development strategy of "specialty in specific disciplines and less comprehensiveness" that was populous then was proposed. With the development of the hospital, these leaders adjusted the strategy again and suggested "strong specialty in specific disciplines and high comprehensiveness", which means to develop comprehensive disciplines and strengthen specialty in infectious diseases. No matter in the introduction of talents or the layout of disciplines, more emphasis was placed on the gradual development of a comprehensive business based on the original. Later, combining the demand for the layout of disciplines, these leaders introduced critical care medicine and established the department of critical care medicine. Surgery was subdivided into thoracic surgery, orthopedics, urology surgery and neurosurgery from the initial obstetrics and the later general surgery. In the meanwhile, around the treatment of infectious diseases that the hospital is characterized by, the department of gastroenterology and the department of respiration were set up. To meet the clinical discipline layout of general hospitals, the hospital completed disciplines of internal medicine, surgery, gynecology, and pediatrics, and set up totally 40 clinical disciplines. In recent years, the hospital's development strategy has been adjusted to "a research hospital featured by comprehensive treatment of infectious diseases". The strategy makes it clear to develop the hospital into a general one instead of overemphasizing that it is a hospital for infectious diseases. After three stages of strategic adjustment, "medical service, medical education and medical research" as the troika for development is highlighted more clearly, and the hospital becomes more research-oriented and encourages scientific research on and scientific innovation in clinical medicine and basic medicine. The development strategy of CPHMC has been adjusted from "specialty in specific disciplines and less comprehensiveness", "specialty in specific disciplines and medium comprehensiveness", to "specialty in specific disciplines and excellent comprehensiveness". In October 2016, it established a comprehensive branch, which supports to solve comprehensive problems of patients with infectious diseases. Cardiovascular, nervous, renal, and endocrine problems of patients with infectious diseases were solved by consultation with and referral to other hospitals, but these problems can be solved by hospitals for infectious diseases now after several years of strategic adjustment.

Secondly, hospitals for infectious diseases represented by Yancheng Second People's Hospital, Fengxian District Guhua Hospital, and The Fourth People's Hospital of Zunyi City develop well by adding noncommunicable diseases businesses. Yancheng Second People's Hospital hanged the "Yancheng Tumor Hospital" plaque in 1994. There is still a gap between a tumor hospital and a general hospital, but the infectious diseases business and the tumor business should be developed parallelly. Only when these two businesses become big and strong can the hospital's revenue and workers' salaries be increased and can the hospital have a better development. In 1995, Fengxian District Infectious Diseases Hospital was renamed as Fengxian District Guhua Hospital, the underlying intention of which was to free itself from the limitation of being a specialist hospital for infectious diseases and develop some comprehensive disciplines. In 2000, the hospital determined its direction and had its second name as Fengxian District Geriatric Hospital. It set up geriatric care wards and developed from 30 beds and one inpatient area to now three geriatric departments and 240 beds. Since 2012, the Health Commission of Fengxian District has provided policy support for the hospital and designated Fengxian District Guhua Hospital to offer legal occupational health surveillance and physical examination of students enrolled, conscripts, and employees. Since 2012, it has been committed to the development of "infectious diseases treatment, geriatric care, and physical examination" as a troika. The Fourth People's Hospital of Zunyi City, which had been a general hospital, was transferred to the local government in 2010. The government positioned it as and required it to be a hospital for infectious diseases. Therefore, the hospital's leaders visited some leading hospitals for infectious diseases in China. The Fourth People's Hospital of Zunyi City had been a general hospital, but in practice, leaders found that the hospital was backward and it had been hard to grow bigger and stronger. It was neither specialized in infectious diseases disciplines nor strong in comprehensive disciplines, so leaders considered, the strategy of "specialty in specific disciplines and less comprehensiveness" was not suitable for the hospital and "strong specialty in specific disciplines and high comprehensiveness" would be the better choice. In July 2019, The Fourth People's Hospital of Zunyi City took over a new hospital district that was built according to the standard of tertiary general hospitals. The hospital's strategy was adjusted from the initial "specialty in infectious diseases treatment", "specialty in specific disciplines and less comprehensiveness", to "strong specialty in specific disciplines and high comprehensiveness" because it was hard to realize the second one. Nevertheless, due to the restriction of what it already had as a general hospital and the hospital's new orientation of

functions, the development of specialized disciplines and that of comprehensive services are of equal importance, so the strategy has been adjusted to "specialty in specific disciplines and high comprehensiveness."

Thirdly, hospitals for infectious diseases represented by Harbin Sixth People's Hospital and Shanghai Pudong New Area Infectious Diseases Hospital are slow in transition and difficult in development. Harbin Sixth People's Hospital is a hospital for infectious diseases with a history of 73 years. However, the hospital started its transition very late and its disciplines are dominated by internal medicine of infectious diseases. Besides, the hospital has suffered losses in successive years, its president and secretary have been changed frequently, and its medium- and long- term development strategy has been discontinuous. In 2018 when the new president took office, he adjusted the hospital's strategy to "be excellent in specialized disciplines and develop comprehensiveness", tried to increase its influence, and made it become Harbin's designated hospitals for the admission and treatment of patients with AIDS. The hospital continued to do well in the full life-cycle medical and surgical treatment of liver diseases. In 2020, the hospital cooperated with Shanghai Eastern Hepatobiliary Hospital, which is influential in hepatology, and invited experts of Shanghai Eastern Hepatobiliary Hospital to perform operations so that patients in Harbin can enjoy medical services provided by top experts locally. In October 2018, the hospital set up a comprehensive surgery department and in July 2019, it introduced a doctor of cardiovascular medicine to establish a comprehensive internal medicine department. The doctor played an important role in the COVID-19 pandemic. Medical staff of the comprehensive surgery department performed cesarean sections for a puerpera confirmed with COVID-19. Another important strategic adjustment is that in October 2018, the hospital changed its name as Harbin Infectious Diseases Hospital that had been used for 73 years to Harbin Sixth People's Hospital and added a third name as Harbin Public Health Clinical Center. The biggest advantage of renaming lies in reducing the psychological fear of the public caused by infectious diseases so that the public are willing to accept the hospital that is undergoing transition into a general hospital. At the beginning, the operation of the hospital was very difficult, with a loss of 13 million yuan in 2017. By adjusting its strategy to "be excellent in specialized disciplines and develop comprehensiveness", the hospital, from March, 2018 to the end of 2018, suffered a loss of 8 million yuan, 5 million yuan less than the figure in 2017. The loss was further decreased by five million yuan in 2019. In 2019, its medical revenue reached a

record high of 77 million yuan. In China, only a handful of hospitals still use the name of "Infectious Disease Hospital" or change its name to "Public Health Center". Shanghai Pudong New Area Infectious Diseases Hospital is one of them that still use the name of "Infectious Disease Hospital". Shanghai Pudong New Area Infectious Diseases Hospital has been worked to develop specialty in specific disciplines and try to make transition, but its strategic adjustment is not that successful currently. By applicability in peacetime and wartime and the combination of medical service, medical education and medical research, in 2003, the hospital joined Shuguang Hospital Affiliated to Shanghai University of Traditional Chinese Medicine. Shanghai Pudong New Area Infectious Diseases Hospital's president is Shanghai's renowned expert in TCM. Its strategy has been adjusted to the development of integrated traditional Chinese medicine and western medicine, so its TCM team has been strengthened. Horizontally, the hospital cooperates with centers for disease control and prevention and combines medical treatment with prevention. Currently, its core departments are the department of TCM, the department of liver diseases, and the department of fatty liver, but it lacks beds for patients with respiratory infectious disease. Although the scale of this hospital is not big, the hospital can sustain itself since the number of its employees is only 80 or so, its medical revenue is about 30 to 40 million yuan, and the financial compensation accounts for 40% of its revenue.

Proposition 5: Hospitals for infectious diseases that can successfully fulfill the task of making emergency response to emerging severe infectious diseases are more likely to have the government's great support.

Hospitals for infectious diseases are usually designated hospitals for the admission and treatment of patients with emerging severe infectious diseases. The Chinese government put forward "life first", and governments at all levels have attached great importance to people's life and mobilized the whole country, the whole province and the whole city to rescue patients. For these hospitals, the most important function given by the government is to undertake the task of making emergency response to emerging severe infectious diseases. China's successful control of the COVID-19 pandemic has made the rest of the world feel the power of China's national system. Every emergency response to emerging severe infectious diseases exposes problems in the public health system, especially that hospitals for infectious diseases commonly have problems of small scale, aged hardware facilities, and weak ability to treat comprehensively and to rescue critically ill patients. Compared with other hospitals, hospitals for infectious diseases are "the

battlefield of epidemics" and play an important role in responding to emerging severe infectious disease epidemics. After the COVID-19 pandemic, China has gradually enhanced the control and prevention of infectious diseases. After hospitals for infectious diseases across the country successfully fulfilled their tasks of admitting and treating patients with COVID-19, their rescue ability has been recognized by the government. The Chinese government has realized the importance of developing hospitals for infectious diseases again and the necessity of taking hospitals for infectious diseases as war preparedness of epidemics as a long-term strategy. The role of hospitals for infectious diseases is similar to that of militaries and firefighters. Whether there is war or fire, the development of national defense forces and the construction of fire control facilities should be strengthened. Seven of eight hospitals in these cases have been approved by municipal governments to build or expand their hospital branches, improve equipment and other hardware facilities, and increase beds. Hospitals for infectious diseases have a once-in-a-century development opportunity.

Proposition 6: Hospitals for infectious diseases that emphasize the capability of scientific and technological innovation and commercialization of scientific and technological achievements are more likely to remain their leading position in health care.

The capability of scientific and technological innovation is the core strategic element and an important engine for the improvement of hospitals' core competence and promotion of their development in the future. China's hospitals for infectious diseases generally meet development bottlenecks and, particularly, have weak research ability, so they feel stressed and challenged to survive and develop. From the cases of eight hospitals for infectious diseases, it can be learned that SPHCC is a research hospital driven by scientific research, CPHMC and Wuxi Fifth People's Hospital have steadily increased their research ability in recent years, but others start scientific research slowly. Two hospitals for infectious diseases at the district level do not have much scientific research, but both hospitals' leaders have realized the significant role of scientific research. Besides, in recent years, the number of scientific research programs that hospitals at the district level have received also increases steadily. The most noteworthy is SPHCC's commercialization of research findings, in which the Center has been at the top among public hospitals for four consecutive years. It has earned 450 million yuan by commercializing scientific and technological achievements and realized that a hospital's scientific research could not only

support clinical diagnosis and treatment but also create income for the hospital. Hospitals for infectious diseases are the fortress of public health. In addition, they are expected to become scientific and technological research and development centers, knowledge innovation centers, and wealth creation centers to ensure their nature of public welfare and sustainable development. When science and technology are transformed into productivity, hospitals for infectious diseases can really get themselves out of their development plights. In Rudolph's study (2017), he encouraged managers to complement their DC with perception, acquisition, transition, and innovation capabilities to facilitate their businesses. Our study also proves his view.

Based on previous analysis, we verify the previous hypothesized theoretical model in Chapter 2 (Figure 2-2), and make further modifications. This study, from the perspective of DC, offers a strategic development model of hospitals for infectious diseases in a rapidly changing environment. Figure 4-10 shows the propositions of the study. These propositions focus on advantageous resources, DC, and strategic choices.

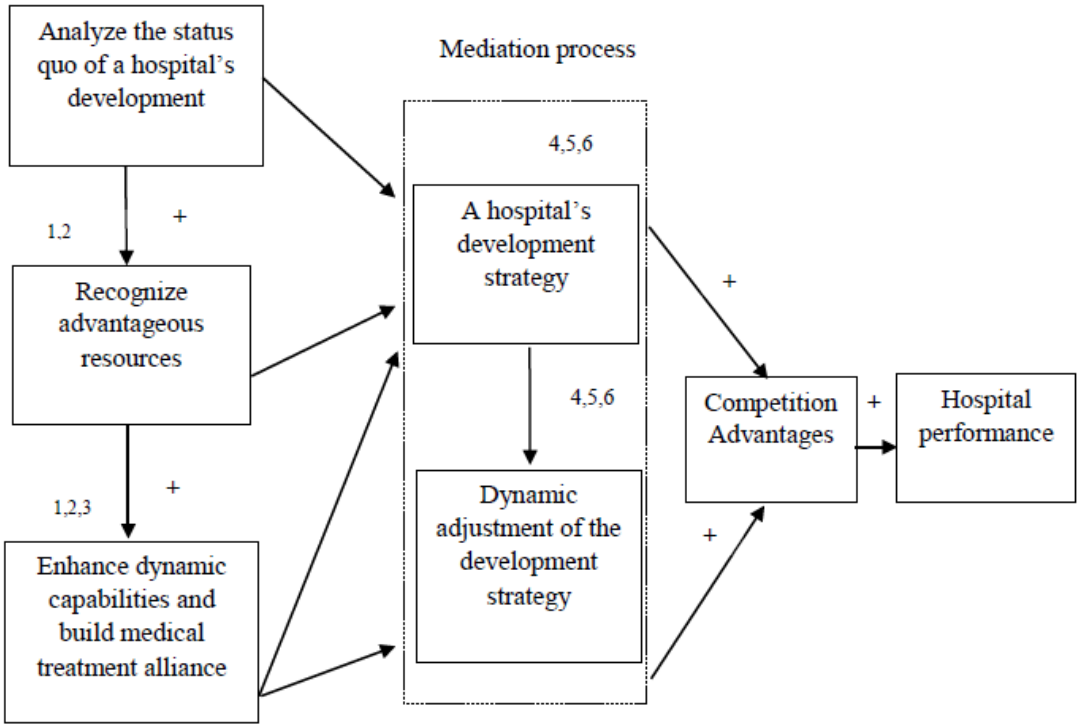

Figure 4-10 Strategic development model of hospitals for infectious diseases in a rapidly changing environment

Note: The numbers correspond to propositions in the dissertation.

Six propositions mentioned above emphatically describe how a hospital's senior

managers formulate development strategies in a rapidly changing environment. For example, a hospital's senior managers need to, first of all, analyze the status quo of the hospital's development and find its plight, advantageous resources, and core competence (Proposition 1 and 2). It enables them to have an objective and comprehensive understanding of the hospital's status quo and make important decisions based on a full analysis of the hospital's internal environment. However, the external environment that includes national policies, politics, the economy, and society, has an impact on the development of hospitals for infectious diseases. In a dynamically changing environment, hospitals' original core competence may become a burden that hinders the hospital's development. Against this backdrop, it is necessary to integrate, develop, and reallocate internal and external resources to adapt to a rapidly changing environment, which means to enhance a hospital's DC (Proposition 3). Research on enterprises' DC is now becoming a hot spot for theorists.

In addition, according to the characteristics of hospitals for infectious diseases, their development strategies should adhere to specialty in infectious diseases and develop comprehensive disciplines, which makes it more possible for them to get out of their survival predicament as soon as possible (Proposition 4). For hospitals for infectious diseases, to develop comprehensive disciplines cannot only increase business income, but also provide comprehensive treatment for patients with infectious diseases. Given that hospitals for infectious diseases are entrusted with the important function of safeguarding urban public health by the government, their most fundamental value is to undertake the task of emergency treatment for patients with infectious diseases. Therefore, the function of "being applicable in peacetime and wartime" should be unshakable. Only in this way can hospitals for infectious diseases have the government's great support after they successfully fulfill the task of making emergency response to emerging severe infectious diseases (Proposition 5).

Finally, when most hospitals for infectious diseases are fighting for being one of "public institutions of the second category that enjoy financial supply for public institutions of the first category", hospitals for infectious diseases that value the capability to commercialize scientific and technological innovations and achievements are more likely to stay ahead in health care (Proposition 6). Hospitals for infectious diseases need not depend entirely on the government to survive and develop because they can transform science and technology into productivity. Only when these hospitals become scientific and

technological research and development centers, knowledge innovation centers, and wealth creation centers can they genuinely develop sustainably and get out of their development dilemma.

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Chapter 5: Conclusions and Recommendations

5.1 Conclusions

The research purpose of this thesis is to analyze the status quo and development strategy of the infectious disease specialist hospitals in China holistically and vertically. By systematically identifying the relevant factors affecting the development of infectious disease hospitals, this research specifically analyzes the current status, resources, core competitiveness, and DC of the hospital, the advantages, problems, and countermeasures of the strategic alliance (medical treatment alliance), and finally summarizes the strategic development path of infectious disease specialist hospitals.

Considering the universality of the research conclusions, the hospitals selected are eight hospitals for infectious disease, including two infectious disease hospitals in municipalities directly under the central government, four prefecture-level city infectious disease hospitals, and two district-level infectious disease hospitals. These hospitals are in different regions with different levels of economic development and own completely different resources. Some hospitals have also gone through detours in their transformation and development, which provides useful otherness for our research. The specific strategic path is as follows.

(1) First of all, the management of each hospital have a profound understanding of the development dilemma. The common problems they face mainly include insufficient government attention and investment, shortage of talents and difficulty in talent introduction, lack of comprehensive discipline capabilities, and operation difficulty brought by infectious diseases business shrinking.

(2) After clarifying the development dilemma, this thesis analyzes the hospital resources of each infectious disease specialist hospital from the perspectives of preponderant disciplines, geographic location, financial subsidy and policy support, hospital scale and hardware facilities, hospital culture and hospital brand, scientific research strength, management level, and emergency capacity to identify superior resources, scarce resources and core competitiveness.

(3) On this basis, this thesis further analyzes how infectious disease hospitals develop DC. DC of the hospital mainly include emergency response capability, resource allocation

capability, active learning capability, strategic thinking and decision-making capability, the ability to turn crises into opportunities, performance lever and process reengineering capability. The enlightenment of the research is that, compared with other hospitals or institutions, the most important DC is the emergency response capability, and is the most important indicator to test the comprehensive capacity of infectious disease hospitals.

(4) Based on the development dilemma, superior resources, core competitiveness, and DC of each hospital, the hospital management propose strategic adjustment. Infectious disease hospitals must adhere to the development strategy of "preparing for both peacetime and wartime", which is the functional positioning given by the government. Maintaining the advantages of infectious disease specialists and developing comprehensive disciplines is a development strategy generally recognized by infectious disease hospitals, which can provide one-stop diagnosis and treatment services for infectious disease patients. However, some district-level infectious disease hospitals have difficulty in developing other comprehensive disciplines such as surgery due to restrictions on medical licenses. In this context, the leadership of the hospital chooses a differentiated competitive strategy, and actively expands other businesses in non-clinical departments, such as the development of medical examination business, medical care and old-age endowment integration, and drug clinical trials. The development of other businesses has greatly supplemented the medical business income and increased medical resource utilization and employee benefits. One of the 8 hospitals was converted from a general hospital to a specialist hospital for infectious diseases, and was again integrated with a community health service center, so it faces a problem that both its specialist and comprehensive capabilities are not outstanding. The sustainable development of hospitals is inseparable from the support of disciplines and cultivation of talents, so all hospitals must attach great importance to the vigorous introduction of discipline leaders and the cultivation of local talents, including the training of professional and technical personnel and management leaders. In the development process, all eight hospitals have established or participated in a strategic alliance (Medical Treatment Alliance), which has also become a way for hospitals to save themselves. Scientific research drive and innovative development are higher-level development strategies and is the only way for hospitals to upgrade their academic status. The development of biomedical industrialization is also the source of wealth creation in the future. In order to truly get rid of the disadvantaged position, infectious disease specialist hospitals must put technological innovation in an important position and gain competitive advantage through continuous innovation.

(5) In the development strategy of infectious disease hospitals, we pay more attention to the effect of establishing a strategic alliance (Medical Treatment Alliance). Existing research suggests that SAs are also a DC and a flexible method for transferring effective knowledge and generating resource portfolios in partner companies. It helps to develop the ability to discover new opportunities and help develop reconfiguration or expansion of existing resources. Once the alliance is properly managed and has a clear structure and purpose, it can help companies achieve sustainable competitive advantage. The alliance can be used as a strategy (Mamédio et al., 2019), and this study also conducted an in-depth analysis in this respect. The eight infectious disease specialist hospitals have actively joined the medical alliance. The advantage of the medical treatment alliance is to facilitate the referral of patients within member hospitals, facilitate the learning, communication and joint scientific research among members, and achieve resource sharing, advantage complementation and expansion of the circle of friends. However, in the construction of the medical alliance, the expected results have not been achieved, and there is generally a lack of substantial interaction. It is easier for patients to be referred to higher-level hospitals, but there are few referrals to lower-level ones. Due to policy factors and benefits distribution issues, there exists difficulty of personnel management among different hospitals and inability to achieve homogeneous management, and there may also appear misunderstanding of “one hospital will lead the others”. In response to the problems in the medical alliance, we propose the following countermeasures: strive for government support, clarify the construction goals and steps, strengthen homogenization and information interconnection, and improve the two-way referral mechanism and channel so as to further enhance exchanges and achieve win-win cooperation. Some hospital leaders suggest that the relationship between the members of medical alliance should be like “two lines, two homes, and blood brothers”, with big hands holding small hands, hospitals with better development providing business guidance to those relatively weak hospitals to help them develop rapidly. On the other hand, relatively weak hospitals cannot rush to merge with general hospitals because of the current poor development. They must still adhere to their own characteristics and rely on the support of the medical alliance to operate and develop independently.

(6) Existing research fails to answer a question: how do hospitals restructure resources in a rapidly changing environment to gain a competitive advantage. This research proposes a theoretical framework for the development strategy of infectious disease hospitals in a rapidly changing environment from the perspective of DC. This new theoretical framework

explains the path of infectious disease hospitals to build a high-performance strategy, and makes contribution to DCT and hospital strategic research. Our research confirms that infectious disease specialist hospitals with more advantageous resources are more likely to gain a competitive advantage. Infectious disease specialist hospitals with good hospital culture, scientific research capabilities, talents, and medical characteristics are more likely to have core competitiveness. Infectious disease specialist hospitals with strong DC are more likely to have a competitive advantage. Infectious disease specialist hospitals that adhere to the specialty of infectious diseases and development of comprehensive disciplines are more likely to get out of the predicament of survival as soon as possible. Infectious disease specialist hospitals that have successfully completed emergency tasks for new major infectious diseases are more likely to receive strong government support. Infectious disease specialist hospitals that value technological innovation and the ability to transform scientific and technological achievements are more likely to maintain a leading position in the medical and health field.

(7) In the development of infectious disease specialist hospitals, local governments have played a vital role. The existing literature and case studies also prove that the management of infectious disease hospitals must actively seek government support. Since 2008, China has carried out a new round of medical reform. Infectious disease hospitals have the dual attributes of public medical institutions and public health institutions. Infectious disease hospitals, through their own reforms and improvement of their core competitiveness, can only relieve the pressure on their operations by seeking government support, because the government has the right to choose the construction address of the hospitals. After the outbreak of SARS in 2003, local governments have repositioned infectious disease hospitals. Most infectious disease hospitals are relocated to suburbs far away from the city. Due to the remote location, few radiation populations, inconvenient transportation, and inadequate life service facilities, it is very inconvenient for patients to seek medical service, and the patient population accumulated over the years is gradually lost. Infectious disease hospitals will also be affected by medical insurance policy restrictions, zero-price policy for medicines and consumables, low pricing of medical services, and inadequate centralized management. These policy factors have a major impact on infectious disease hospitals. Relative to policy restrictions, government investment is obviously insufficient. Infectious disease hospitals undertake the function of infectious disease treatment, such as emergency treatment of newly emerging major

infectious diseases, free anti-viral treatment for AIDS patients, and free anti-tuberculosis treatment for tuberculosis patients. These tasks belong to the government's public welfare undertakings, and the funds required should be borne by the government finance, and the government should provide the funds needed for hospital development. However, judging from the overall operation of infectious disease hospitals across the country, in face of sudden outbreaks, the expenditure is often advanced by hospitals, and insufficient government compensation is a common problem. Although infectious disease hospitals are listed as an important part of the public health system, most hospitals do not enjoy the compensation provided by relevant policies. Many infectious disease hospitals have suffered losses year after year and their survival is difficult to maintain. Some infectious disease hospitals are forced to give up infectious disease specialties. Instead, they participate in market competition and rely on market-oriented operations to obtain funds to maintain the survival of the hospital, which, to a certain extent, dilutes the special functions undertaken by infectious disease hospitals in preparing for major epidemics. After the outbreak of the COVID-19, local governments have attached great importance to the infrastructure construction of infectious disease hospitals and the infrastructure was extended on a large scale. It is worth thinking that how can the infectious disease hospital develop themselves after expansion. If there is no financial support for personnel and basic operation, the infectious disease hospitals that have just gone out of the predicament will face the problems encountered by a batch of infectious disease hospitals relocated to the outskirts after SARS in 2003. Infectious disease specialist hospitals with weak operating capacity are unable to afford high operating costs and personnel expenses. If the professional team construction and technical reserve for the treatment of infectious diseases cannot be improved, it is still difficult to effectively deal with emergencies or interdisciplinary problems.

5.2 Research innovation

(1) Theoretical innovation

In the 8 case studies of this research, QSR NVivo 12 is adopted for inductive analysis, from the perspective of DCT, combined with RBV and strategic alliance theory, the thesis presents a comprehensive analysis of the relationship between the development status, hospital resources, core competitiveness, DC, strategic adjustment of infectious disease hospitals and performance. While specifically defining the DC of infectious disease

hospitals, the author also constructs a strategic model suitable for infectious disease hospital development under a rapidly changing environment. The research results validate the proposition and the existing literature, and propose that the most important DC of infectious disease specialist hospitals is the emergency response capability, which presents certain theoretical innovation.

(2) Application value

The development of DC and strategic adjustment capabilities are the core for infectious disease hospitals to maintain a competitive advantage in the fierce competition. This research comprehensively analyzes the theoretical framework of DC. In combination with the empirical research results and based on the reality of the development of infectious disease specialist hospitals in China, the research systematically reviewed the current status, characteristics and development strategies of infectious disease hospitals in different provinces and cities, different starting points and different levels. The dilemma, resources, and development strategies of infectious disease specialist hospitals are analyzed in detail, and optimization strategies for their development are proposed. Formulating development strategies and nurturing competitive advantages for infectious disease specialist hospitals can provide a scientific basis and reference for their healthy and sustainable development.

5.3 Research limitation

(1) Research on the DC of enterprises has gradually become a hots issue in theoretical research. This research attempts to introduce the DCT into the formulation of infectious disease hospital development strategies. However, research on the DC in the field of health care has not yet formed a system, and DC of the hospital need to be given a clearer definition on the basis of more thorough discussions.

(2) Due to the prevention and control of the COVID-19, the interview was mainly designed to take the opportunity of an occasion when leaders of infectious disease hospitals outside Shanghai pay a visit to the SPHCC for inspection and exchange so as to conduct an in-person interview or to complete the interview by phone. There was no opportunity to go out of Shanghai to other infectious disease hospitals to have face-to-face exchanges with more senior and middle-level managers in hospitals. The length of interviews is limited by objective conditions. It is hoped that more in-depth exchanges can be conducted in the future.

5.4 Recommendations for future research

(1) This research mainly adopts qualitative methods. The dimensional construction of hospital DC and the mechanism of its impact on competitive advantage and performance still need to be studied. Subsequent research can integrate quantitative methods to further verify the interaction between hospital resources, DC, strategic adjustment, competitive advantages and hospital performance.

(2) The hospital operation data involve business secrets, and the hospital will selectively retain key data, making it impossible to fully obtain the hospital operation data required by the research. In future research, with the establishment of the operating mechanism of the medical treatment alliance of infectious diseases in the Yangtze River Delta and the forthcoming China Public Health Medical Treatment Alliance, cooperation and exchanges between infectious disease hospitals will become more frequent and the relationship will be closer. The leaders of the hospitals will be more willing to use the alliance platform to voice common ideas through the analysis of big data and make policy recommendations to the government, so the availability of subsequent data may be more convenient.

(3) Affected by objective conditions, this research selected 8 infectious disease hospitals as case study objects and interviewed 35 middle and senior managers. These 8 infectious disease hospitals are located in East China, Northeast China, Southwest China, and there is no analysis of infectious disease hospitals in North China, South China, West China, and Central China. The research conclusions and recommendations are drawn based on existing cases, and are not enough to represent the national level. In the future, the research objects can be further expanded, supplemented by a large number of empirical studies, and through comprehensive comparative analysis, the development status and development strategy of the DC of the infectious disease specialist hospitals will be analyzed more scientifically.

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Appendix 1: Related Figures

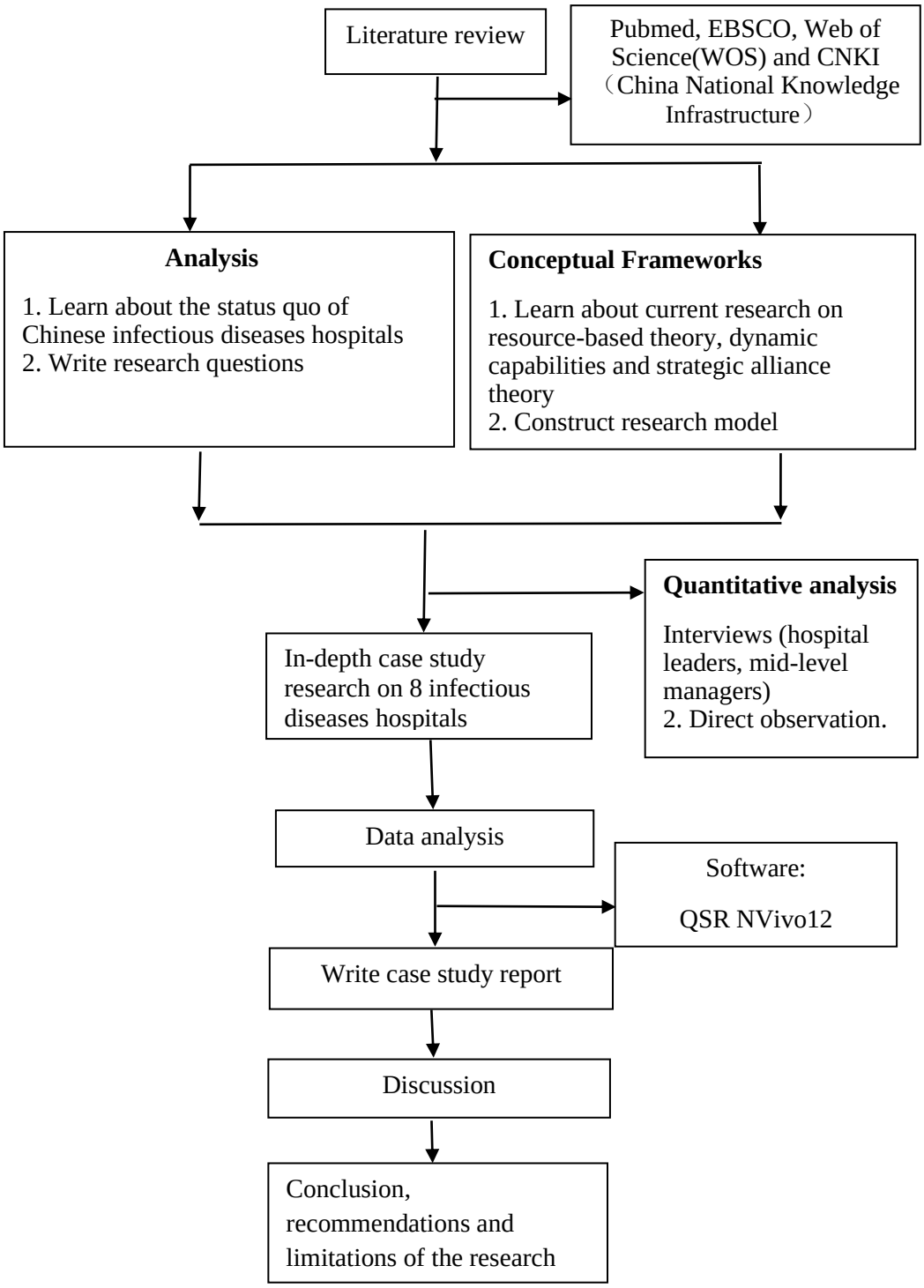

Figure 1 Research flowchart

Figure 1 The relationship between resource heterogeneity and immobility, value, rareness, imperfect imitability, and substitutability, and sustained competitive advantage
Source: Barney (1991)

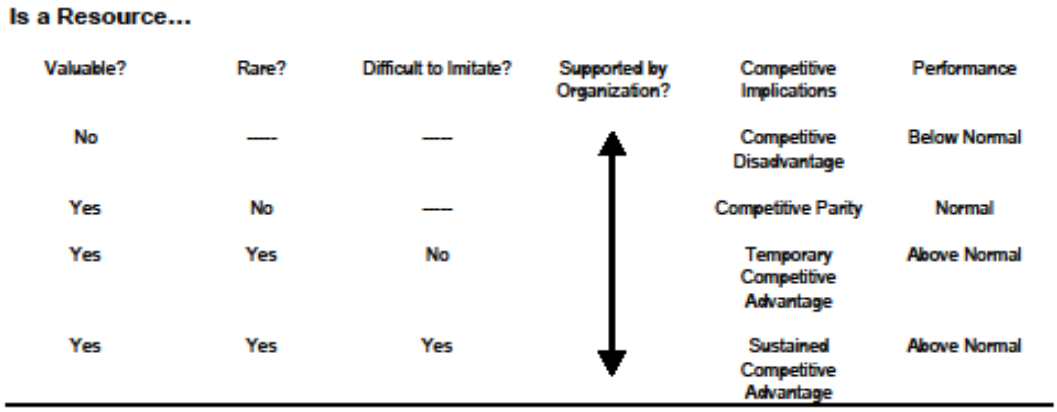

Figure 2 The VRIO framework
Source: Barney and Wright (1998)

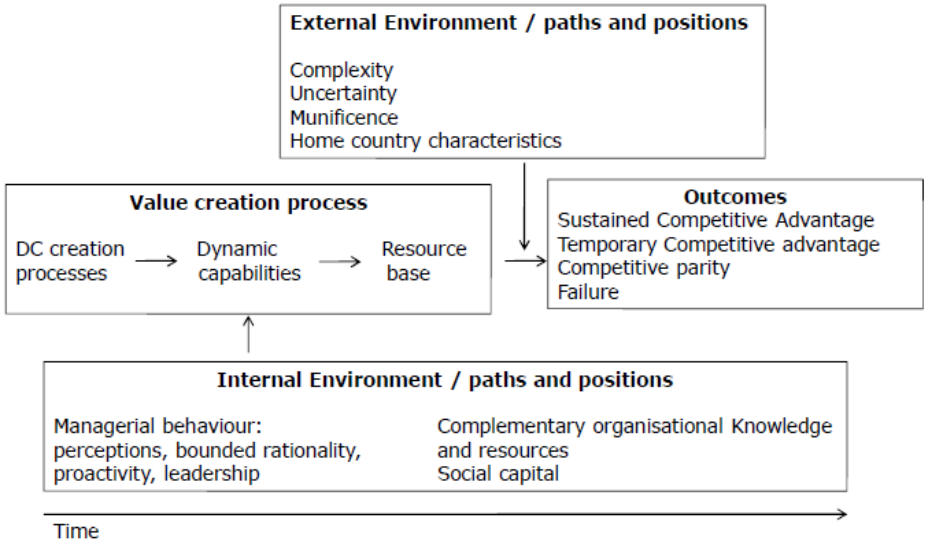

Figure 3 External and internal view of dynamic capabilities
Source: Véronique Ambrosini and Cliff Bowman (2009)

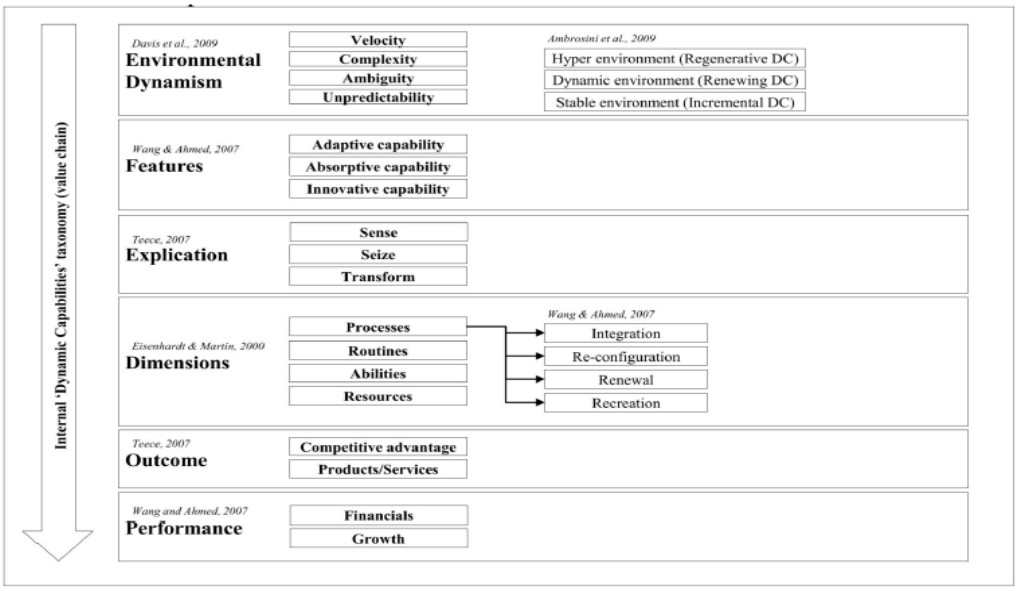

Figure 4 Dynamic capabilities-typologies
Source: Rudolph (2017)

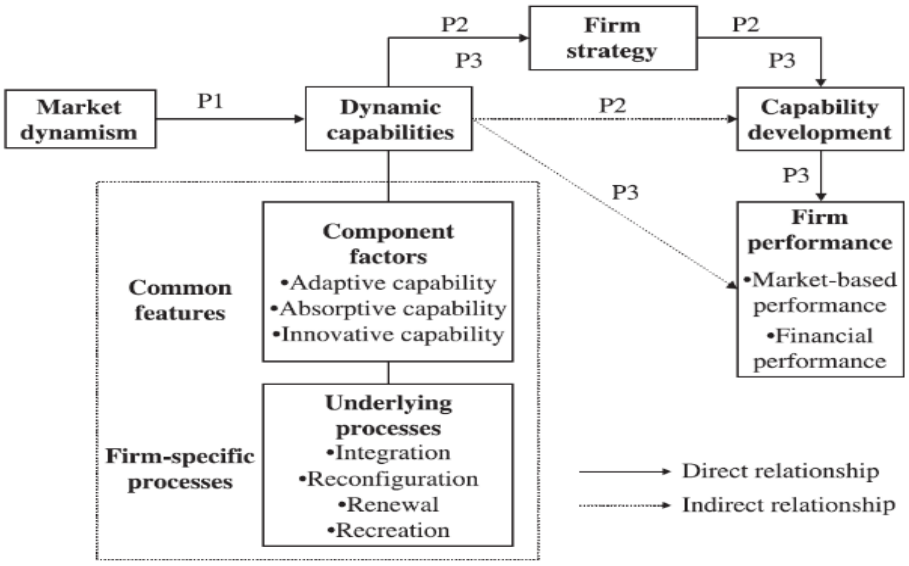

Figure 5 A research model of dynamic capabilities
Source: Teece (2007)

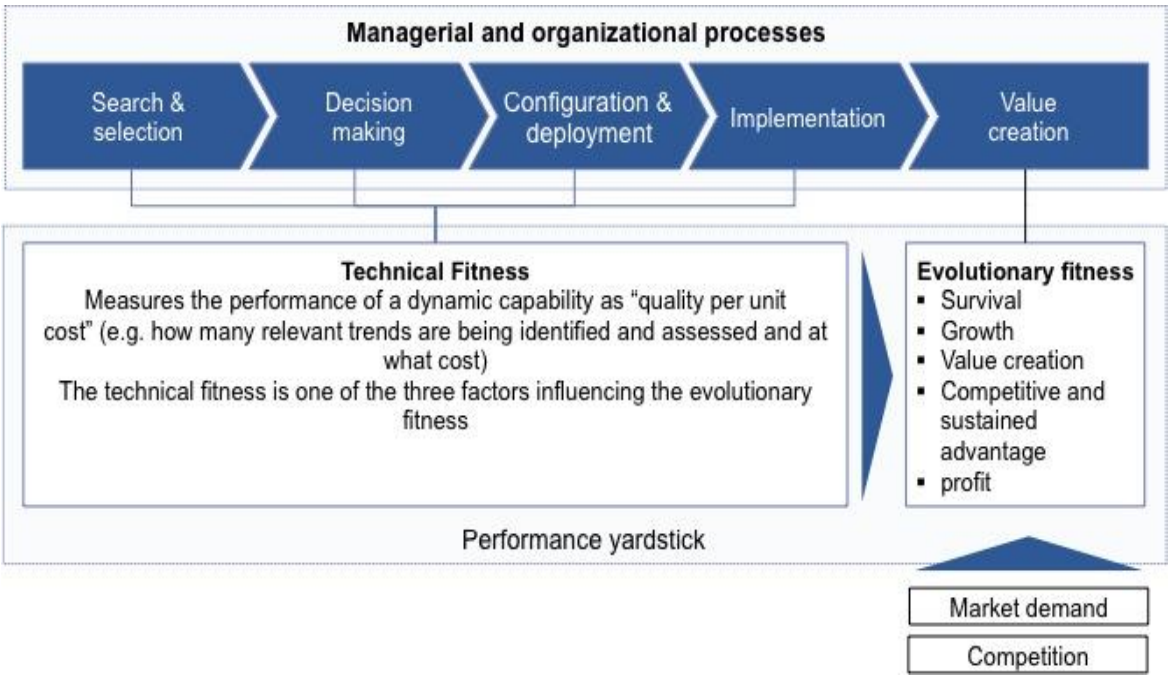

Figure 6 Measuring the effective of dynamic capabilities
Source: Helfat et al. (2007)

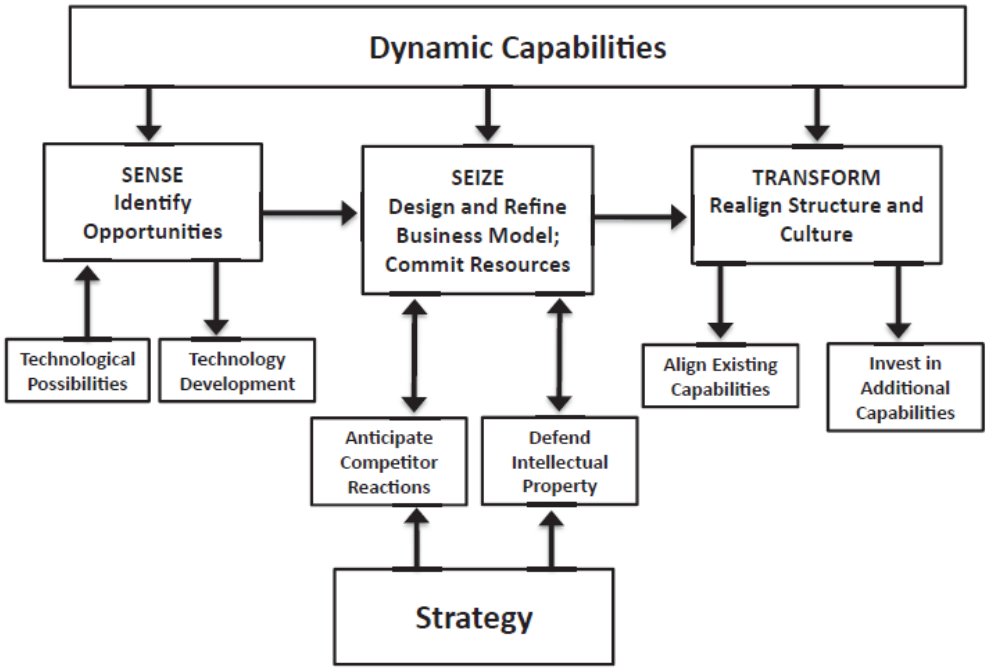

Figure 7 Simplified schema of dynamic capabilities, business models, and strategy
Source: Teece (2018)

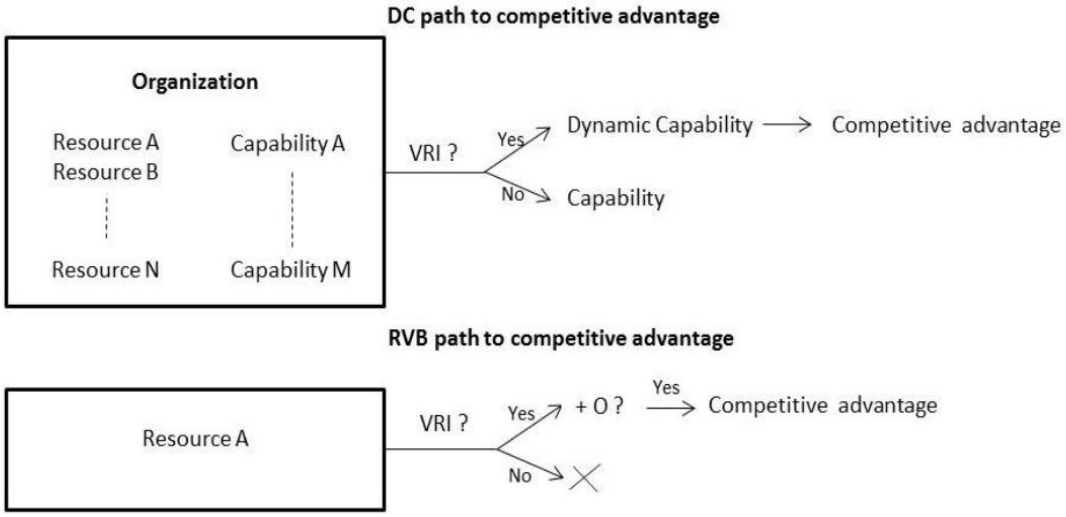

Figure 8 RBV/DC paths to competitive advantage
Source: Cardeal and António (2012)

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Appendix 2: Research Protocol

A. Introduce the cases to be studied and the purpose of the case study.

A1 Research purpose and theoretical propositions

A2 Guiding role of case study

B. Data collection process.

B1 Units, places and interviewees to be interviewed

B2 Data collection plan (including interview date, interview time)

B3 Preparations before the interview (listed interview outline, literature)

C. Research questions of case study.

C1 As an infectious disease hospital, compared with other hospitals, what are the core competitiveness of hospitals?

C2 As an infectious disease hospital, what challenges and dilemmas does the hospital face in the development process?

C3 In recent years, what strategic adjustments has the hospital made in the development direction?

C4 Has hospital established strategic alliance, Medical Association? What is the effect after implementation?

C5 What are the advantages and disadvantages of the implementation of Medical Association? How do you solve the problems?

C6 What are the Advantageous Resources of hospital? (it can be answered from the aspects of medical level, scientific research ability, hospital scale, advantageous disciplines, financial subsidies, core departments, policy support of public hospitals, hospital culture, hospital brand, hospital geographical location.)

C7 The question of dynamic capability of hospital: What adjustments have been made to the above advantageous resources according to the changing environment?

C8 What is the relationship between hospital's advantageous resources and dynamic capabilities, core competitiveness and hospital performance?

C9 The relationship between hospital development strategy adjustment and hospital advantage resources? (the question focuses on understanding the role of strategic planning)

C10 The relationship between hospital strategic adjustment and dynamic capability change, and between strategic adjustment and hospital core competitiveness and hospital performance.